

74-6
HSL No. 74-6

April 26, 1974

THIS ISSUE CONTAINS:

HS-013 901-913; 915-918; 920-945;
956-990

HS-820 282-284; 305

U.S. Department of
Transportation

National Highway
Traffic Safety
Administration



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Highway Safety Literature

... A SEMI-MONTHLY ABSTRACT JOURNAL

NOTICE

IN AN EFFORT TO IMPROVE THE UTILITY OF HSL FOR ITS USERS, WE HAVE INCLUDED SOME COPIES OF A QUESTIONNAIRE. THIS QUESTIONNAIRE IS ALSO BEING USED TO ADD TO OR MODIFY OUR MAILING LIST. THEREFORE, YOU MUST FILL OUT AT LEAST THAT PART OF THE QUESTIONNAIRE AND MAIL IT TO US IF YOU WISH TO RECEIVE HSL.

Material directly related to Highway and/or Motor Vehicle Safety is solicited for inclusion in Highway Safety Literature. Topics must fall within the scope of the mission of the National Highway Traffic Safety Administration. Submit material, together with a written statement of approval for publication to:

Office of Administrative Services (N48-50)
National Highway Traffic
Safety Administration
400 7th Street, S.W.
Washington, D.C. 20590

Please indicate availability source and price for the material.

Special notice: Material published in HSL is intended only for information. References to brand names, equipment models or companies does not imply endorsement by the NHTSA or the U.S. Department of Transportation.

[Redacted area]

Entries in **Highway Safety Literature** are arranged in numerical order by HS accession number. Documents related directly to the National Highway Traffic Safety Administration (NHTSA) are numbered according to the following series: Accident Investigation Reports HS 600 000; Compliance Test Reports HS 610 000; Contractor's Reports HS 800 000; Staff speeches, papers, etc. HS 810 000; Imprints HS 820 000.

A document containing several articles is announced as complete volume under an HS number referring to it as a whole. Entries for individual articles are listed under their own HS numbers.

SAMPLE ENTRIES

JOURNAL ENTRY

Title of Document { **SYNTHESIS OF CASE LAW JURISPRUDENCE RELATING TO WET-WEATHER HIGHWAY CONDITIONS**

Journal Citation → Highway Research Record n 376 p29-36 (1971)

Author(s) → D. C. Oliver 1971

Sponsored by Highway Res. Board Steering Com. for Workshop on Anti-Skid Program Management and presented at the workshop.

Search Terms { Descriptors: *Liability, *Negligence, *Accident responsibility, *Legal responsibility, *Wet road conditions, *Court decisions, *State government, *Skidding accidents, *Warning signs, *Highway maintenance, *Litigation, *Icy road conditions,

Abstract { The extant case law on legal liability for accidents occurring on icy and wet highways has established three central areas and one subarea in the jurisprudence of maintenance liability. These areas are compliance with general duties in order to escape liability; damages resulting from noncompliance (negligence); contributory negligence as a bar to recovery; and advisory signing as a technique in meeting general duties. Court decisions covering these four areas are presented.

NHTSA Accession Number → HS-012 289

*Subject heading in Subject Index

CONTRACT REPORT

EQUIPMENT AND PROCEDURES FOR MEASURING GLARE FOR MOTOR VEHICLES. FINAL REPORT

Corporate author → Teledyne Brown Engineering

N. E. Chatterton J. D. Hayes E. W. George 1972 102p

Availability → Contract DOT-HS-089-1-139

NTIS

Descriptors: *Glare, *Glare reduction, *Visual perception, *Photometers, *Luminance, *Hydraulic equipment, *Central vision, *Field of view, *Backgrounds, *Contrast, *Light conditions, *Brightness, *Test facilities, *Test equipment, *Vehicle safety standards, *Simulators, *Light, *Reflectance, *Measuring instruments,

A procedure and description of equipment for measuring glare from a driver's own vehicle are presented. The procedures are based on a disability glare theory as applied to foveal vision. Two pieces of apparatus were constructed to provide the measurement capability. One of them simulates diffuse sky glare and the other simulates direct solar glare. Methods of combining data from these measurements are presented along with scaling laws selected to provide a value for glare as it would be under natural daylight conditions. A standard for allowable glare levels from the vehicle is developed which is independent of the measurement procedure. Test results from a passenger car are presented and compared with this standard. Recommendations for improvements to the apparatus and additional research requirements for improvement to the theory are made.

HS-800 731

*Subject heading in Subject Index

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O.M.B. No. 04-R5654

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REPORT NUMBER INDEX

1. ACCIDENTS

TRAFFIC SAFETY '72. A REPORT ON THE ACTIVITIES OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION AND THE FEDERAL HIGHWAY ADMINISTRATION UNDER THE HIGHWAY SAFETY ACT OF 1966 AND THE NATIONAL TRAFFIC AND MOTOR VEHICLE SAFETY ACT OF 1966

National Hwy. Traf. Safety Administration, Washington, D.C.
For primary bibliographic entry see Fld. 5.
HS-800 989

1A. Emergency Services

EMERGENCY MEDICAL SERVICES. CRASH INJURY MANAGEMENT FOR TRAFFIC LAW ENFORCEMENT OFFICERS. STUDENT STUDY GUIDE

Dunlap and Associates, Inc., Darien, Conn.
For primary bibliographic entry see Fld. 1B.
HS-820 282

EMERGENCY MEDICAL SERVICES. CRASH INJURY MANAGEMENT FOR TRAFFIC LAW ENFORCEMENT OFFICERS. INSTRUCTOR'S LESSON PLANS

Dunlap and Associates, Inc., Darien, Conn.
For primary bibliographic entry see Fld. 1B.
HS-820 283

EMERGENCY MEDICAL SERVICES. CRASH INJURY MANAGEMENT FOR TRAFFIC LAW ENFORCEMENT OFFICERS. COURSE GUIDE

Dunlap and Associates, Inc., Darien, Conn.
For primary bibliographic entry see Fld. 1B.
HS-820 284

1B. Injuries

AN EVALUATION OF SIDE-GUARD DOOR BEAMS

For primary bibliographic entry see Fld. 5D.
HS-013 902

THE EFFECTS OF THE DESIGN OF THE STEERING ASSEMBLY AND THE INSTRUMENT PANEL ON INJURIES (ESPECIALLY AORTIC RUPTURE) SUSTAINED BY CAR DRIVERS IN HEAD-ON COLLISION

Journal of Trauma v12 n8 p715-24 (Aug 1972)
R. Coermann, G. Dotzauer, W. Lange, G. E. Voigt 1972 5refs
See serial citation

Steering system design, Head on collisions, Impact caused injuries, Occupant vehicle interface, Instrument panel impact areas, Aortic injuries, Abdominal injuries, Cadavers in testing, Accident simulation, Instrument panel design, Aortic rupture, Chest injuries, Steering wheel caused injuries, Driver vehicle interface, Injury research, Instrument panel caused injuries

Six head-on collisions are simulated with an electrohydraulic accelerator. The injuries by the impacts due to the design of the

steering assembly are studied on human cadavers. Forces transmitted from the steering wheel and the panel to the body are recorded, as well as the blood pressure in the aorta. It is shown that the bodily injuries inflicted by steering assemblies with a shock-absorbing pot are much less severe than those produced by conventional ones.

HS-013 903

PERFORMANCE EVALUATION OF THE GENERAL MOTORS HYBRID 2 ANTHROPOMORPHIC TEST DUMMY. FINAL REPORT

Calspan Corp., Buffalo, N. Y.
For primary bibliographic entry see Fld. 3B.
HS-800 919

HEAD INJURY MECHANISMS. FINAL REPORT

National Inst. of Neurological Diseases and Stroke, Bethesda, Md.
A. K. Ommaya 1973 234p 57refs Rept. No. PB-226 828
Contract DOT-HS-081-1-106-1A
Report for 1 May 71 to 30 June 73.
NTIS

Head injuries, Brain injuries, Brain concussion, Human body impact tolerances, Impact forces, Inertial forces, Primates, Electrophysiology, Neurophysiology, Biomechanics, Cervical spine impact tolerances, Impact caused skeletal damage, Whiplash injuries, Skull fractures, Cerebral hemorrhage, Pathology, Injury research, Head impact areas, Head movement, Memory, Autopsies, Blood vessels, Stress (Physiology), Animal impact tolerances, Animal acceleration tolerances, Head acceleration tolerances, Head impact tolerances, Human body mechanical impedance, Anthropomorphic dummies, Human body simulation, Neurologic manifestations, Animal tissues, Electrocardiography, Sinusoidal vibration tolerances, Mathematical models, Human body segment parameters, Impact tests

Rotational components of inertial loading appear essential for cerebral concussion, but both rotational and translational components are involved in the production of brain lesions. Evoked potential recording has been found to be an extremely powerful quantitative method of obtaining in vivo evidence of functional as well as structural failure in the injured brain.

HS-800 959

EMERGENCY MEDICAL SERVICES. CRASH INJURY MANAGEMENT FOR TRAFFIC LAW ENFORCEMENT OFFICERS. STUDENT STUDY GUIDE

Dunlap and Associates, Inc., Darien, Conn.
A. M. Cleven 1973 54p 1ref Rept. No. PB-226 932
Instructor's Lesson Plans is HS-820 283; Course guide is HS-820 284.
GPO

Emergency medical services, Police training, Workbooks, Manuals, Airway maintenance, Physical examinations, Resuscitation, Impact caused injuries, Occupant rescue, Emergency equipment, Burns, Transportation of injured, Soft tissue injuries, Shock (pathology), Hemorrhage, Fractures, Diabetes mellitus, Epilepsy, Drug effects, Childbirth, First aid, Medical emergencies

In a continuing effort to improve highway and road safety, a standardized approach has been developed to train law enforce-

Group 1B—Injuries

ment officers patrolling in radio-equipped cars who may arrive first at the scene of a traffic accident. This volume in a three volume course is a student study guide. It contains an overview of the human body for diagnosis and discusses emergency services. Information is given on breathing characteristics and airway equipment; pulmonary and cardiopulmonary resuscitation; shock, bleeding, and injuries to soft tissues; fractures and dislocations; skeletal and skull injuries; chronic existing ailments; poisons and drugs; burns and exposure to heat and cold; emergency childbirth; gaining access to victims; moving patients, patient examination and triage; and directions for field training. HS-820 282

EMERGENCY MEDICAL SERVICES. CRASH INJURY MANAGEMENT FOR TRAFFIC LAW ENFORCEMENT OFFICERS. INSTRUCTOR'S LESSON PLANS

Dunlap and Associates, Inc., Darien, Conn.
A. M. Cleven 1973 181p 7refs Rept. No. PB-226 933
Course Guide is HS-820 284; Student Study Guide is HS-820 282.
GPO

Emergency medical services, Police training, Instruction manuals, Physical examinations, Respiration, Airway maintenance, Resuscitation, Impact caused injuries, Shock (pathology), Burns, Occupant rescue, Emergency equipment, Drug effects, Legal factors, Hemorrhage, Fractures, Soft tissue injuries, Medical emergencies, Alcohol effects, Transportation of injured, First aid, Childbirth

A training course has been developed in emergency medical care, directed principally toward law enforcement officers patrolling highways and roads in radio-equipped cars and being first responders to traffic accidents. This volume in a three document series is intended to aid instructors who are conducting the training program. The rescuer is assumed not to be an ambulance medical technician, and his vehicle can have only limited space for emergency treatment, no space for transporting a patient, and only simple car tools. The course covers responsibilities at the accident scene, legal aspects, airway care, resuscitation, bleeding control, prevention of shock, crash-related injuries including wounds, fractures, and burns; preexisting illnesses and conditions, miscellaneous factors such as poisons and exposure; patient examination and diagnosis, gaining access to victims, moving injured persons, and use of dressings, bandages, and splints. Field training is also included. HS-820 283

EMERGENCY MEDICAL SERVICES. CRASH INJURY MANAGEMENT FOR TRAFFIC LAW ENFORCEMENT OFFICERS. COURSE GUIDE

Dunlap and Associates, Inc., Darien, Conn.
A. M. Cleven 1973 27p 7refs Rept. No. PB-226 931
Instructor's Lesson Plans is HS-820 283; Student Study Guide is HS-820 282.
GPO

Emergency medical services, Police training, Impact caused injuries, Instruction manuals, Airway maintenance, Resuscitation, Physical examinations, Occupant rescue, Emergency equipment, Shock (pathology), Burns, Drug effects, Legal factors, Medical emergencies, Fractures, Hemorrhage, Childbirth, Alcohol effects, Diabetes mellitus, Transportation of injured, First aid, Soft tissue injuries, Epilepsy

A course is prepared for highway patrolling law enforcement officers who may arrive first at a traffic accident. The scope includes officer roles and responsibilities at the scene, legal aspects of rendering emergency medical care, life threatening emergencies, pulmonary and cardiopulmonary resuscitation, control of bleeding, prevention of shock; characteristics of injuries, fractures, dislocations, and burns; existing illnesses or conditions important in a crash, such as childbirth, diabetes, alcohol, or drug abuse; patient examination, access to victims with simple tools, moving injured persons; and equipment and supplies. This volume of a three volume set is a general guide to the course. HS-820 284

HUMAN IMPACT RESPONSE: MEASUREMENT, EVALUATION, AND SIMULATION. A BIBLIOGRAPHY

National Hwy. Traf. Safety Administration, Washington, D. C.
Anonymous 1973 59p 500refs Rept. No. PB-226 844
NTIS

Accident survivability, Bibliographies, Restraint systems, Impact protection, Anthropometry, Human body impact tolerances, Crashworthiness, Vehicle design, Computerized simulation, Injury prevention, Injury research

The bibliography is limited to the collection of the Administration and emphasizes studies on the air bag and other protective devices and their effects; computer simulation of crash victims; animal, human and dummy studies; and basic tests on biological structure changes under stress. Other studies include: anthropometrics, pedestrian accidents, noise factors, Air Force and NASA studies, and the design of motor vehicles for safety. HS-820 305

1C. Investigation And Records

SUMMARY OF ACCIDENT INVESTIGATIONS 1972

Bureau of Motor Carrier Safety, Washington, D. C.
R. A. Kaye 1973 125p Rept. No. PB-226 903
Corporate author

Accident statistics, Accident investigation, Accident reports, Accident causes, Truck accidents, Bus accidents, School bus accidents, Single vehicle accidents, Vehicle vehicle collisions, Environmental factors, Time of accidents, Fatalities, Injuries, Annual reports, Bridge failures, Explosions, Ejection, Driver experience, Driver records, Driver age, Accident location, Driver error caused accidents, Failure caused accidents, Head on collisions, Rear end collisions, Multiple vehicle accidents, Accident caused fires, Side impact collisions, Ran off road accidents, Vehicle train collisions, Loss of control caused accidents, Transportation of hazardous materials, Truck defects, Bus defects, Property damage accidents, Damage costs

This annual report summarizes in-depth accident field investigations and represents a synopsis of 305 accidents that occurred in the calendar year of 1972, resulting in 438 fatalities, 1153 injuries, and —11,335,950 property damage. The report covers many of the more serious motor carrier accidents and contains extensive data and numerous comparisons with respect to accident conditions, vehicle equipment, hazardous cargoes, personnel and environmental factors. The presentation is comprised of two basic parts: accidents classified by type, and accident investigation report summaries. HS-013 936

**MOTOR CARRIER ACCIDENT INVESTIGATION.
REFRIGERATED TRANSPORT CO., INC. ACCIDENT,
MARCH 8, 1973, CARTERSVILLE, GEORGIA**

Bureau of Motor Carrier Safety, Washington, D. C.
Anonymous 1973 11p Rept. No. 73-4
Corporate author

Accident case reports, Accident investigation, Single vehicle accidents, Tractor semitrailers, Fatalities, Alcohol usage, Drug usage, Truck accidents, Ran off road accidents, Injuries, Driver records, Beer, Marijuana, Georgia, Drinking drivers, Driver confusion, Driver error caused accidents

A truck driver disoriented from the use of alcohol and/or drugs lost control of his tractor-semitrailer, ran off the right side of the roadway and into a ditch before overturning in a culvert. One fatality, two injuries and —12,500 property damage was the result.

HS-013 937

**MOTOR CARRIER ACCIDENT INVESTIGATION.
MIDWEST FARM SUPPLY ACCIDENT, APRIL 28,
1973, COURTLAND, KANSAS**

Bureau of Motor Carrier Safety, Washington, D. C.
Anonymous 1973 12p Rept. No. 73-5
Corporate author

Accident case reports, Accident investigation, Head on collisions, Tire defects, Tractor semitrailers, Fatalities, Tire failure caused accidents, Truck accidents, Kansas, Injuries

A defective left front tire failed on a tractor semitrailer combination causing loss of control and headon impact with an automobile. It was daylight and clear, two car occupants were killed, two injured and —10,600 property damage.

HS-013 938

**MULTI-PURPOSE COLLISION TRAJECTORY
SENSING**

ASSE Journal v18 n12 p14-9 (Dec 1973) a
P. E. Tartaglia 1973 6p
See serial citation

Accident prevention, Collision courses, Vehicle trajectories, Sensors, Front end collisions, Rear end collisions, Side impact collisions, Vehicle fixed object collisions, Injury severity, Radar, Logic circuits, Warning signals, Vectors (Mathematics), Equations, Vehicle detectors, Injury prevention, Audio warning devices

The author discusses radar-logic systems as a means of driver-warning with the output of an audio alarm signal. The desired effect is the prevention of highway accidents, involving collisions from the front, rear, or side, or with stationary objects, protection from injury once an accident is occurring, and reduction of the severity of accident caused injuries. The design problem is three fold; it must be applicable to different types of accidents, it should provide the capability of complete accident avoidance, and inescapable injury must be reduced. Radar equipment is shown to be more satisfactory than sonic or infrared devices. Vector analysis is used to describe the positions and distance of vehicles on collision course. Output is an audio alarm signal. Use is indicated to deployment of a restraint system, automatic headway control, or backup in an automated highway system.

HS-013 969

**A STUDY TO DETERMINE THE RELATIONSHIP
BETWEEN VEHICLE DEFECTS AND FAILURES,
AND VEHICLE CRASHES. SUMMARY OF FINAL
REPORT**

Indiana Univ., Bloomington
Anonymous 1973 50p Rept. No. PB-225 306,
DOT-HS-034-2-263-VDP-73-1
Contract DOT-HS-034-2-263
NTIS

Accident analysis, Trilevel accident investigation, Failure caused accidents, Automobile defects, Driver performance, Weather caused accidents, Precrash phase, Multidisciplinary teams, Statistical analysis, Driver error caused accidents, Monroe County (Ind.), Drinking drivers, Environmental factors, Brake failures, Accident causes, Accident severity, Research methods, Accident factors, Accident rates

Results of a tri-level accident investigation program focused on the relative roles played by human, environmental, and vehicular deficiencies in causing and increasing the severity of automobile accidents, are summarized. The study was based in Monroe County, Ind. Data were collected on three levels: baseline data were assembled to allow definition of the project universe; accidents were investigated on-site at the time of occurrence by two- or three-man teams of technicians; and a sample of these accidents was independently examined by a multidisciplinary team. The summary includes: major conclusions; data collection techniques; relative frequency with which human, environmental, and vehicular factors were judged to be accident causes or severity-increasing factors; a comparison of the pre-crash safety condition of vehicles involved in the investigated accidents and a sample of all Monroe County vehicles in terms of outage rates of various components; and comparisons between investigated, study area, and national driver, vehicle roadway, and accident populations.

HS-800 902

**MULTIDISCIPLINARY ACCIDENT STUDY. PACIFIC
NORTHWEST. FINAL REPORT**

Stanford Res. Inst., Menlo Park, Calif.
E. L. Myers, R. Cronin, N. David, M. A. Robertson 1973 378p
refs Rept. No. PB-226 867
Contract DOT-HS-199-2-319
NTIS

Accident investigation, Accident studies, Statistical analysis, Accident causes, Injury causes, Human factors, Vehicle safety standards, Defects, Highway safety standards, Driver error caused accidents, Traffic control devices, California, Accident rates, Fatality rates, Time of accidents, Motorcycle accidents, Accident types, Accident analysis, Restraint system usage, Highway characteristics, Damage severity, Driver records, Rain, Environmental factors, Drinking drivers, Multidisciplinary teams, Highway design, Injuries by body area, Injury severity, Driver characteristics, Safety program evaluation, Precrash phase, Crash phase, Postcrash phase

The Stanford Research Institute Crash Analysis Team investigated 39 vehicle accidents in depth as part of the study: General Multidisciplinary Accident Study: Pacific Northwest. Summary statistics and clustering causes of the 39 accidents and resultant injuries. Analytic results are given for human, environmental, and vehicle factors. The 39 accidents are evaluated with respect to compliance to current Federal Motor Vehicle Safety Standards and Highway Safety Program Standards. Recommendations for the revision of standards are made.

Group 1C—Investigation And Records

HS-800 962

2. HIGHWAY SAFETY**TOP RACERS CRASH, SPEED IN OFF-TRACK ROAD USE MORE THAN OTHER DRIVERS**

Insurance Inst. for Hwy. Safety, Washington, D. C.
For primary bibliographic entry see Fld. 3F.
HS-013 915

TOP RACERS CRASH, SPEED IN OFF-TRACK ROAD USE MORE THAN OTHER DRIVERS

Insurance Inst. for Hwy. Safety, Washington, D. C.
For primary bibliographic entry see Fld. 3F.
HS-013 915

ON-THE-ROAD DRIVING RECORDS OF LICENSED RACE DRIVERS

Insurance Inst. for Hwy. Safety, Washington, D. C.
For primary bibliographic entry see Fld. 3F.
HS-013 916

HSRI'S OAKLAND COUNTY 1971 DATA FILE: A CRITIQUE

HIT Lab Reports v3 n11 p1-14 (Jul 1973)
T. Lawson 1973
See serial citation

Accident statistics, Statistical analysis, Data analysis, Automated accident records, Driver behavior, Accident records, Accident causes, Highway characteristics, Accident types, Drinking drivers, Driver error caused accidents, Oakland County (Mich).

This article evaluates one of HSRI's mass accident data bases, the 1971 Oakland County, Michigan, file. The file is discussed in terms of structure, content, specific reporting biases, and usefulness as a research and analysis tool. Since the 1971 Oakland County, Michigan, data base is both typical of other Oakland County files and representative of the type of mass accident data bases maintained at HSRI, this critique provides both specific and general suggestions for the accident base researcher.

HS-013 918

SUMMARY OF ACCIDENT INVESTIGATIONS 1972

Bureau of Motor Carrier Safety, Washington, D.C.
For primary bibliographic entry see Fld. 1C.
HS-013 936

MULTIDISCIPLINARY ACCIDENT STUDY. PACIFIC NORTHWEST. FINAL REPORT

Stanford Res. Inst., Menlo Park, Calif.
For primary bibliographic entry see Fld. 1C.
HS-800 962

2. HIGHWAY SAFETY**2G. Meteorological Conditions****TRUCK NOISE 3B. ACOUSTIC AND PERFORMANCE TEST COMPARISON OF INITIAL QUIETED TRUCK WITH CONTEMPORARY PRODUCTION TRUCKS**

Freightliner Corp., Portland, Oreg.

M. C. Kaye, E. E. Ungar 1973 128p Rept. No. PB-226 845,
DOT-TST-74-2
Contract DOT-OS-20095
Subcontracted to Bolt, Beranek and Newman, Inc., Cambridge, Mass.
NTIS

Vehicle noise, Truck design, Acoustic measurement, Engine enclosures, Mufflers, Vibration, Vibration isolators, Noise control, Engine design, Engine noise, Engine speeds, Engine performance, Exhaust noise, Fan noise, Engine mounts, Measuring instruments, Performance tests, Noise standards, Truck specifications

This report begins with the acoustic and performance testing of a number of contemporary White-Freightliners powered by the Cummins NTC-350 engine in order to establish a datum from which quieted truck designs could be evaluated. Next, the engine to be used in the quieted test truck is characterized. The text then goes on to describe the details of construction and the tests made on the initial quieted truck configuration. The noise tests directly compared the quieted test truck to a datum truck and to a passenger car.

HS-013 904

2I. Traffic Control**DIAGRAMMATIC GUIDE SIGNS FOR USE ON CONTROLLED ACCESS HIGHWAYS. VOL. 1. RECOMMENDATIONS FOR DIAGRAMMATIC GUIDE SIGNS**

BioTechnology, Inc., Falls Church, Va.; Federal Hwy. Administration, Washington, D.C.
T. M. Mast, G. S. Kolsrud 1972 65p 18refs Rept. No. FHWA-RD-73-21, PB-226 077
Contract FH-11-7815
Rept. for Aug 71-Dec 72.
NTIS

Diagrammatic signs, Sign design, Sign effectiveness, Human factors engineering, Controlled access highways, Sign legibility, Character recognition, Interchanges, Right turn lanes, Left turn lanes, Sign standards, Sign warrants, Field tests

The entire diagrammatic signing research program objectives are summarized. Recommended warrants, standards and guidelines for diagrammatic guide signs and the research basis for the recommendations are presented. Techniques and measures for the evaluation of highway signing are suggested. Findings obtained under the project indicate: drivers require more time to read and interpret diagrammatic guide signs than conventional ones; as the graphic component on the sign becomes more complex, driver interpretation time increases; and diagrammatic guide signs will produce a benefit to motorist performance at interchanges where traffic must exit to the left of the through route. Recommendations include: diagrammatic signs must use simple graphic designs, and diagrammatic signs should be deployed at interchanges with left exits on a national basis. It is recommended that diagrammatic signs not be deployed at interchanges with single right exits, common cloverleaf interchanges, or very complex interchanges.

HS-013 935

SELECTING DIGITAL COMPUTER SIGNAL SYSTEMS

Federal Highway Administration, Washington, D.C.
C. R. Stockfisch 1972 85p 38refs Rept. No. PB-226 822,
FHWA-RD-72-20

GPO \$1.05 as stock no. 5001-00057

Traffic signal networks, Computer controlled signals, Electronic traffic control, Area traffic control, Traffic control optimization, Traffic signal costs, Traffic signal effectiveness, Fixed time traffic control, Traffic management, Traffic engineering, Urban area, Digital computers, Traffic surveillance, Intersections, Communication systems, Decision making, Vehicle detectors

This paper points out the problem confronting traffic engineers and decision makers as they contemplate the selection of advanced traffic-control systems to alleviate traffic congestion in urban areas. The objective has been to provide guidelines by which alternatives may be evaluated and a traffic-signal system selected. Based on suggested evaluation criteria, each element of a complete signal system may be investigated. These elements include urban types, geographical control areas, control techniques, surveillance systems, intersection equipment communication systems, and data-processing equipment. No attempt has been made to recommend specific control systems, system components, or techniques, but preferred alternatives have been indicated as guides. Benefits from existing computer installations indicate the general degree of improvements that can be expected in future installations. Total system costs are shown as a measure of expected future investments.
HS-013 967

TESTING VARIABLES BY COMPUTER SIMULATION

For primary bibliographic entry see Fld. 4G.
HS-013 972

3. HUMAN FACTORS

TRAFFIC SAFETY '72. A REPORT ON THE ACTIVITIES OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION AND THE FEDERAL HIGHWAY ADMINISTRATION UNDER THE HIGHWAY SAFETY ACT OF 1966 AND THE NATIONAL TRAFFIC AND MOTOR VEHICLE SAFETY ACT OF 1966

National Hwy. Traf. Safety Administration, Washington, D.C.
For primary bibliographic entry see Fld. 5.
HS-800 989

3A. Alcohol

USE OF VIDEOTAPE AND PERSONALITY TESTING IN DETECTION AND STUDY

Police Chief v40 n12 p58-67 (Dec 1973)
A. G. LeBlanc, M. E. Brennan 1973 refs
See serial citation

Drinking drivers, Driver personality, Videotapes, Coronado (Calif.), Driver characteristics, Field tests, Convictions, Data acquisition, Driver attitudes, Blood alcohol levels, Military personnel, Sociological factors, Alcohol usage

A study of drinking drivers in Coronado, California is presented. The Coronado police forces now utilize videotaping at the point of apprehension, and at the station, a choice of breath, blood or urine analysis to determine the blood alcohol content (BAC). Emphasis is placed on the problem of military personnel who, though they have a high BAC, show no evidence at the videotaping. Various hypotheses are presented

as to why this is so and why so many military personnel are apprehended. It does appear that people with a high BAC do not feel their ability to drive particularly impaired.
HS-013 968

3B. Anthropomorphic Data

THE EFFECTS OF THE DESIGN OF THE STEERING ASSEMBLY AND THE INSTRUMENT PANEL ON INJURIES (ESPECIALLY AORTIC RUPTURE) SUSTAINED BY CAR DRIVERS IN HEAD-ON COLLISION

For primary bibliographic entry see Fld. 1B.
HS-013 903

PERFORMANCE EVALUATION OF THE GENERAL MOTORS HYBRID 2 ANTHROPOMORPHIC TEST DUMMY. FINAL REPORT

Calspan Corp., Buffalo, N. Y.
J. S. Miller 1973 179p 1ref Rept. No. PB-225 005, ZS-5272-V-1
Contract DOT-HS-053-3-603
Rept. for 17 Feb-17 Apr 1973.
NTIS

Head impact tolerances, Human body impact tolerances, Statistical analysis, Anthropomorphic dummies, Performance tests, Biokinematic models, Human body simulation, Restraint system tests, Air bag restraint systems, Seat belt effectiveness, Test reproducibility, Chest impact tolerances, Abdominal impact tolerances, Leg impact tolerances, Dynamic tests, Static tests, Low speed impact tests

Two identical dummies were furnished to be tested for: measurement and verification of the degree of conformance of these dummies with a 'Purchase Description of the NHTSA 50th Percentile Anthropomorphic Test Dummy;' and establishment, by appropriate testing, of the ranges of performance and repeatability of these test devices under conditions of representative crash environments. A series of twelve static and dynamic component tests were satisfactorily performed to measure the GM Hybrid 2 dummy in accordance with the purchase description test procedures and specifications. Twenty type-2 belt restraint tests and twenty air bag restraint tests were performed using an accelerator sled to simulate a 30 mph impact crash.
HS-800 919

HUMAN IMPACT RESPONSE: MEASUREMENT, EVALUATION, AND SIMULATION. A BIBLIOGRAPHY

National Hwy. Traf. Safety Administration, Washington, D. C.
For primary bibliographic entry see Fld. 1B.
HS-820 305

3C. Cyclists

A LOOK AT MOTORCYCLE ACCIDENTS IN 1972

For primary bibliographic entry see Fld. 5C.
HS-013 921

Group 3D—Driver Behavior

3D. Driver Behavior

ACCIDENT OR SUICIDE? DESTRUCTION BY AUTOMOBILE

Suicide Prevention Center, Los Angeles, Calif.

N. Tabachnick, ed., J. Gussen, R. E. Litman, M. L. Peck, N.

Tiber, C. I. Wold 1973 270p refs

Charles C. Thomas, Publisher, 301-327 East Lawrence Ave., Springfield, Ill. —11.95

Suicide by vehicle, Accidents, Alcohol effects, Drug effects, Mental disorders, Psychological factors, Stress (Psychology), Driver behavior research, Anxiety, Depression, Hallucinations, Reaction time, Risk taking, Psychopathology, Chi square test, Driver mental fitness, Motivation, Interviews, Appendicitis, Suicide attempts, Alcohol usage

The volume explores suicidal and self-destructive trends in drivers who become involved in automobile accidents. Specific features of the project include: an objective test of 13 hypotheses related to such issues as suicide, self-destruction and drug taking and using two comparison groups of suicidal and non-self-destructive persons; a psychodynamic review and interpretation of psychoanalytical interviews; a study of significant others (wives, mothers, etc.) of the main subjects; and the examination of methods of improving the validity of the study. Suicide and other self-destructive factors, psychological determinants and the roles of alcohol and mental illness in accident drivers are evaluated. The final chapter presents suggestions for the reduction of the accident toll, primarily by a strong program of education.

HS-013 906

WAS IT THE DRIVER-OR THE COMPANY? ANALYZING DRIVER ATTITUDES

Commercial Car Journal p84-93 (Nov 1973)

R. Cross 1973

See serial citation

Driver attitudes, Truck drivers, Vehicle safety, Safety program effectiveness, Benefit cost analysis, Fleet safety, Preventive maintenance, Truck inspection, Amphetamines, Fleet management, Driver motivation, Tractor trailers, Truck safety standards, Suspension systems, Steering columns, Steering system failures, Truck maintenance, Horns, Fifth wheel devices, Trailer brakes, Trailer tires

The article reviews the attitudes of long haul truck drivers towards company safety programs. The consensus is that top management, although in favor of safety and maintenance programs, does not follow through with implementation of the programs. This attitude leads to loss of goods, and time, and lowers driver morale. Recommendations for improving safety programs are made.

HS-013 920

3E. Driver Education

CURRICULUM FOR TRAINING OF SCHOOL BUS DRIVERS IN THE STATE OF ILLINOIS

Southern Illinois Univ., Carbondale

Anonymous 1973 275p 136refs Rept. No. PB-226 929

NTIS

School bus drivers, Driver education, Illinois, Driving task analysis, Instruction materials, Driver behavior, Curricula,

Systems analysis, Judgment, Perception, Decision making, Memory, Visual acuity, Driver skills, Vehicle control, Defensive driving, Traffic laws, Driver physical fitness, Alcohol effects, Drug effects, Public relations, School bus standards, Accidents, Driver emergency responses, Vehicle inspection, Vehicle maintenance

The program of instruction outlined in the report reflects recent trends and developments in curriculum construction and traffic safety research. Emphasis is placed on behavioral aspects of the total driving task rather than on the tasks as such. The content of the course focuses on the processes, decisions, commitments, and actions of drivers. Three major components make up each unit of instruction: a unit objective is stated in behavioral terms; a brief outline of subject matter content is included; and a few suggested learning activities or instructional objectives for each unit are selected for their potential in developing desired behavior. It is hoped that these units may form the basis for quality programs in school bus trainee education.

HS-013 966

3F. Driver Licensing

TOP RACERS CRASH, SPEED IN OFF-TRACK ROAD USE MORE THAN OTHER DRIVERS

Insurance Inst. for Hwy. Safety, Washington, D. C.

R. Hoar 1973 3p.

Corporate author

Racing drivers, Driver behavior, Automobile accidents, Collisions, Driver performance, Traffic law violations, Accident proneness, New York, Florida, Texas, Driver records, Risk taking, Classified driver licenses

The research compares the highway driving records of 446 national competition license holding race drivers in Florida, New York and Texas with those of 1053 other drivers in those states. It finds that the driving records of Sports Car Club of America national competition license holders contained more violations and more crashes than the driving records of comparison drivers of the same sex and age.

HS-013 915

ON-THE-ROAD DRIVING RECORDS OF LICENSED RACE DRIVERS

Insurance Inst. for Hwy. Safety, Washington, D. C.

A. F. Williams, B. O'Neill 1973 22p 9refs Rept. No. PB-226 901

Corporate author

Accident statistics, Traffic law violations, Racing drivers, Driver education, Driver performance, Driver records, New York, Texas, Florida, Classified driver licenses, Driver skills, Driver mileage

The concept of a 'Master Driver's License' is explored by studying the belief that a race driver has fewer crashes and is more law abiding than the average driver. The on-the-road driving records of all Sports Car Club of America national competition license holders were obtained, where possible, and also those of a comparison group of drivers. Results indicated in each state a greater number of crashes per driver and a greater number of violations per driver for the Sports Car Club of America members. Supporting statistics are included.

HS-013 916

3K. Pedestrians

BEHAVIORAL EVALUATION OF PEDESTRIAN SIGNALS

Traffic Engineering v44 n2 p22-6 (Nov 1973)
R. G. Mortimer 1973 8refs
See serial citation

Pedestrian control signals, Pedestrian behavior, Accident prevention, Pedestrian safety, Signal effectiveness, Urban intersections, Chi square test

Observations were made of pedestrians crossing urban intersections with and without pedestrian signals to evaluate the effectiveness of pedestrian signals. It was found that compliance was better at intersections with pedestrian signals: that the signals provided useful information, and that an index of hazard rate was lower at intersections with pedestrian signals. A substantial proportion of crossings involved pedestrian-vehicle conflicts on all signal phases. These may be reduced by further human engineering of pedestrian signals, restricting vehicle turns and increasing enforcement.
HS-013 971

3L. Vision

VISUAL TESTS FOR DRIVER LICENSING

Highway Research Board Special Report n134 pl-9 (1973)
R. L. Henderson, A. Burg 1973 20refs
See serial citation

Vision tests, Driver vision standards, Visual acuity, Vision age changes, Driver license examination, Night driving, Uniformity, Visual fields, Driver license standards, Economic factors

The report summarizes the variety of driver licensing tests and the lack of agreement among them with regard to passing standards. There are no tests or requirements for night vision, nor is any consideration given to the dynamic aspects of visual performance. The study shows some relation between static visual acuity and greater correlation between dynamic visual acuity and driving record. A vision test for driver license screening should be valid, reliable, standardized, cost-effective, and commercially available. Currently used tests fail these requirements. More research toward understanding the role of vision in driving is proposed.
HS-013 973

4. OTHER SAFETY-RELATED AREAS

TRAFFIC SAFETY '72. VOL. 2. A REPORT ON ACTIVITIES UNDER THE NATIONAL TRAFFIC AND MOTOR VEHICLE SAFETY ACT

National Hwy. Traf. Safety Administration, Washington, D.C.
For primary bibliographic entry see Fld. 5.
HS-800 990

4A. Codes And Laws

RULES OF THE ROAD RATED

Traffic Laws Commentary v2 n1 (Aug 1973)
National Com. on Uniform Traf. Laws and Ordinances, Washington, D.C.
E. F. Kearney 1973 32p 7refs Rept. No. PB-226 606
Contract DOT-HS-107-3-696
GPO \$0.65

Traffic law uniformity, Uniform Vehicle Code, State laws, Traffic laws

State traffic laws are compared with the 'Rules of the Road' chapter of the Uniform Vehicle Code. A precise picture of the status of state traffic laws as of 1 Jan 1973 is presented. This will facilitate rapid identification of particular areas of a state's laws that may not be in substantial conformity with the Code, indicate areas of the statutory law where uniformity may be markedly poor on a nationwide basis, and identify states whose traffic laws may need substantial attention on a priority basis as part of contemporary efforts to improve highway safety.
HS-800 905

4E. Information Technology

HSRI'S OAKLAND COUNTY 1971 DATA FILE: A CRITIQUE

For primary bibliographic entry see Fld. 1E.
HS-013 918

CONGRESSIONAL DOCUMENTS: A BIBLIOGRAPHY, 1956-1972

National Hwy. Traf. Safety Administration, Washington, D.C.
Anonymous 1973 110p Rept. No. PB-226 823
NTIS

Bibliographies, Highway safety, United States government, Indexes, Federal role, Vehicle safety standards, Air pollution, Hearings, Traffic laws, Emission standards, Vehicle noise

The bibliography was compiled in Technical Reference Division, National Highway Traffic Safety Administration, from documents available for use within the Division. It includes documents from 1956 through 1972. Citations in the bibliography include accession number, Congress, Session, Committee, title, Congressman associated with report, date and collation. The catalog section is followed by indexes to Committee, proper name, document number, congress-session, and a KWIC index of titles.
HS-800 982

4F. Insurance

AUTOMOBILE INSURANCE LOSSES. COLLISION COVERAGES. INITIAL RESULTS FOR 1973 MODELS COMPARED WITH 1972 MODELS. RESEARCH REPORT

Highway Loss Data Inst., Washington, D.C.
Anonymous 1973 140p Rept. No. HLDI-R73-1
See also HS-013 934.
Corporate author

Insurance claims, Accident costs, Automobile repair costs, Damage costs, Collisions, Vehicle age, Vehicle safety standards, Low speed collisions, Automobile models, Compact automobiles, Damage claims, Automobile size

This report describes variations in vehicle losses, in both the frequencies and sizes of claims, for damage to twenty 1973 model year private passenger vehicle series during the first ten months of availability. All 1973 model automobiles were required to comply with the Department of Transportation Federal Motor Vehicle Safety Standard 215. This standard was intended to provide protection against damage to a limited range of 'safety related equipment' in 5 mph front-end crashes

Group 4F—Insurance

and in 2.5 mph rear-end crashes. Although the standard was not primarily intended to reduce low-speed crash damage, it was widely hoped there would be such a reduction. In order to measure some of this expected change, baseline results are also presented for the corresponding 1972 model year vehicles, obtained from the same period of time as the 1973 model year results, and from the same insurance companies. The average loss payment per insured vehicle year for all of the 1973 models was —49, for 1972 was —50.
HS-013 905

AUTOMOBILE INSURANCE LOSSES. COLLISION COVERAGES. VARIATIONS BY MAKE AND SERIES. 1972 MODELS. RESEARCH REPORT

Highway Loss Data Inst., Washington, D.C.

Anonymous 1973 161p refs Rept. No. HLDI-R72-1

See also HS-013 905.

Corporate author

Insurance claims, Accident costs, Automobile repair costs, Damage costs, Collisions, Automobile models, Compact automobiles, Driver age, Damage claims, Automobile size, Station wagons, Luxury automobiles, Economic factors

This report describes variations in vehicle losses, in both the frequencies and sizes of claims, for damage to 1972 model year private passenger vehicles of twelve domestic makes and one foreign make during their first eighteen months of availability. It is based on data from collision coverages, insurance covering damage to the insured vehicle itself, supplied by three companies: Kemper, Nationwide, and State Farm. As a group, the full size series tended to have slightly lower average loss payments per insured vehicle year than the other market classes. Tables show breakdowns between size series, makes and models, and driver age.

HS-013 934

4G. Mathematical Sciences

TESTING VARIABLES BY COMPUTER SIMULATION

Traffic Engineering v44 n2 p14-20 (Nov 1973)

G. A. Giannopoulos 1973 3refs

See serial citation

Simulation models, Traffic models, Computerized simulation, Dynamic models, Queueing models, Traffic simulation, Urban traffic flow, Peak hour traffic, Variables, Driver behavior, Traffic engineering, London

The report describes a model developed to simulate traffic conditions in a selected area and to test the feasibility of new or different traffic control systems. Output of the model consists of reports printed at the request of the user and may cover congestion at intersections, a summary of conditions during a given time interval, or a final report giving a summary of a number of time intervals or a summary for the whole of the simulation run. Comparison of the simulation and actual observation of the traffic conditions of an area showed that the model is accurate and a practical one to use in solving traffic congestion problems. With further development, the model can extend its usefulness to include alternate solutions.

HS-013 972

5. VEHICLE SAFETY

TRAFFIC SAFETY '72. A REPORT ON THE ACTIVITIES OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION AND THE FEDERAL HIGHWAY ADMINISTRATION UNDER THE HIGHWAY SAFETY ACT OF 1966 AND THE NATIONAL TRAFFIC AND MOTOR VEHICLE SAFETY ACT OF 1966

National Hwy. Traf. Safety Administration, Washington, D.C.

Anonymous 1973 69p Rept. No. PB-226 859

Prepared in cooperation with Federal Hwy. Administration, Washington, D.C.

GPO \$1.45 as Stock no. 5003-00139

National Traffic and Motor Vehicle Safety Act of 1966, Highway Safety Act of 1966, Drinking drivers, Experimental vehicles, Accident survivability, Restraint systems, Pedestrian safety, Driver education, Motorcycle safety, Emergency medical services, Federal laws, Vehicle safety standards, Accident investigation, National Driver Register, Public information programs, Seat belt effectiveness, Fatality prevention, Driver licensing, Traffic engineering, School bus safety, Highway safety standards, Roadside hazards, Occupant protection, Highway design, Safety design, Police traffic services

The report discusses a wide variety of subjects briefly including: traffic safety, drinking drivers, Experimental Safety Vehicle Program, crash survivability, safety belts, emergency medical services, driver education and licensing, police, traffic records, highway design, motorcycles, pedestrians, accident locations, Federal Motor Vehicle Safety Standards, making motor vehicles safer, research and highway safety, driver improvement, accident investigation, and public awareness of motorizing hazards.

HS-800 989

TRAFFIC SAFETY '72. VOL. 2. A REPORT ON ACTIVITIES UNDER THE NATIONAL TRAFFIC AND MOTOR VEHICLE SAFETY ACT

National Hwy. Traf. Safety Administration, Washington, D.C.

Anonymous 1973 144p Rept. No. PB-226 860

Report for 1 Jan-31 Dec 1972.

GPO \$1.95

Vehicle design, Highway safety, National Traffic and Motor Vehicle Safety Act of 1966, Crashworthiness, Vehicle handling, Vehicle stability, Tires, Wheels, Vehicle visibility, Human factors engineering, Defects, Vehicle control, Experimental vehicles, Accident investigation, Vehicle lighting, Public information programs, Highway safety programs, National Driver Register, Performance tests, Rule making, Field of view, Compliance tests, Used automobiles, Occupant protection, Brake systems, Safety design, Fatality rates, Driver licenses, Vehicle mileage, Driver characteristics

This second volume goes into detail with 1972 accomplishments in carrying out the purposes of the National Traffic and Motor Vehicle Safety Act of 1966 through Federal Motor Vehicle Safety Standards and those programs and research pertinent to this aspect of the national traffic safety effort. Rulemaking activities in crashworthiness systems involved motorcycle helmets, child seating systems, pedestrian protection, structural crashworthiness, restraint systems field test, and anthropomorphic dummies. Motor vehicle maneuverability systems to help improve highway safety were concerned with

handling and stability, tires and wheels, lighting and visibility, and driver environment. NHTSA's standards enforcement activity continued to investigate catastrophic motor vehicle accidents. National Driver Register, the Agency's public information program, and financial assistance to the States were also continued.
HS-800 990

5A. Brake Systems

FMVSS 121--AIR BRAKE SYSTEMS. WHAT IT MEANS TO THE TRUCK BUILDER

Automotive Engineering v81 n8 p27-37 (Aug 1973)
Anonymous 1973
See serial citation

Air brakes, Antiskid brakes, Skid control, Speed sensors, Brake systems, Brake tests, Antilocking devices, Truck safety standards, Brake maintenance, Manufacturing, Modulating valves, Brake performance

Numerous air brake anti-skid systems, each representing a unique approach to achieving a common goal, are being promoted to fill the market created by the performance criteria contained in Federal Motor Vehicle Safety Standard No. 121. This article examines nine of these systems to determine the range of available features and performance and to discover what new factors will have to be taken into account by vehicle manufacturers to accommodate anti-skid systems as standard equipment.
HS-013 923

FRICTION CODES VERSUS BRAKE LINING QUALITY

Automotive Engineering v81 n8 p52-6 (Aug 1973)
F. C. Skelton 1973
See serial citation

Coding systems, Brake linings, Friction materials, Quality control, Acceptability, Materials tests

Standards cover certain specified characteristics of a product's performance and not necessarily the total quality. Quality may include non-measurable aspects, such as the degree to which the products satisfies the needs of a specific user. Therefore it is a mistake to judge the total quality of a product such as brake linings solely by arbitrary coding systems, based on one performance characteristic.
HS-013 925

FMVSS 121--AIR BRAKE SYSTEMS. HOW IT AFFECTS TRACTOR-TRAILER COMBINATIONS

Automotive Engineering v81 n9 p37-48 (Sep 1973)
G. W. Stearns 1973
See serial citation

Brake standards, Air brakes, Tractor semitrailers, Truck emergency brakes, Antilocking devices, Truck brakes, Brake performance, Brake controls, Trailer brakes, Brake modulating systems, Parking brakes

The article gives an analysis of problems and solutions in applying FMSVV 121 to existing tractor-trailer combination vehicles. A modulated type of emergency control system is recommended as promoting the desired degree of driver control over the vehicle in an emergency.
HS-013 926

FMVSS 121--AIR BRAKE SYSTEMS. HOW IT INFLUENCES AXLE AND BRAKE DESIGN

Automotive Engineering v81 n10 p39-45 (Oct 1973)
C. F. Thornton 1973
Based on SAE-730697, Operation Redesign: Axles and Brakes for MVSS 121.
See serial citation

Air brakes, Brake design, Axle loads, Hubs, Antiskid devices, Brake dynamometers, Laboratory tests, Front axles, Brake torque, Rear axles, Wheel design, Brake standards, Truck brakes

Front axle components require considerable redesign to comply with FMVSS 121. A reasonable basis for redesigning for increased front braking levels is use of dynamic weight transfer based on center of gravity to wheelbase transfer. Foundation brake size for front axles must be selected to handle the 'balance of torque' not provided by rear axles at the limit of tire-to-ground adhesion.
HS-013 931

ASBESTOS EMISSIONS FROM BRAKE DYNAMOMETER TESTS

Ford Motor Co., Dearborn, Mich.
A. E. Anderson, R. L. Gealer, R. C. McCune, J. W. Sprys 1973
11p 10refs Rept. No. SAE-730549
Presented at Automobile Engineering Meeting, Detroit, 14-18 May 1973.
SAE

Air pollutants, Asbestos, Brake dynamometers, Air pollution emission factors, Brake emissions, Brake tests, Brake lining wear, Laboratory tests, Electron microscopes

Dynamometer tests of a production disc brake provided new information on asbestos fiber emissions during break-in, normal use, and high temperature use conditions. Both ambient air and brake cooling air were sampled isokinetically, using 0.45 micrometer filters. Examination of test and background filters required a clarification process to maximize fiber detectability, the use of transmission electron microscopy (at 40,000X) for detection, and electron diffraction for positive identification of asbestos fibers. Most of the lining asbestos was found to be converted to a nonfibrous material by the high flash temperatures of the braking surface. Less than 0.02% of the lining wear was released as asbestos fibers. The concentration of asbestos fibers in the urban atmosphere, due to brake usage, was conservatively estimated at less than 0.07×10 to the minus 9th power g/cu m. Based on this upper bound, the use of brakes was judged to be not significant as a source of atmospheric asbestos.
HS-013 956

PASSENGER VEHICLE AND LIGHT-TRUCK BRAKING SYSTEMS INSPECTION EQUIPMENT. PHASE 1. VOL. 1. SUMMARY FINAL REPORT

Bendix Res. Labs., Southfield, Mich.
T. W. Keranen, A. E. Sisson, P. Bounds 1973 31p Rept. No. PB-225 347, BRL-TR-73-6784
Contract DOT-HS-090-2-477
Rept. for 26 June 1972-13 Aug 1973. Vol. 2 is HS-800 964.
NTIS

Brake systems, Inspection equipment, Inspection standards, Brake tests, Brake dynamometers, Brake inspection, Performance tests

Group 5A—Brake Systems

The Phase 1 portion of the program determined the methods and specifications for a brake system inspection system. Also accomplished on the program was an evaluation of existing inspection equipment. The brake inspection criteria developed defines a need for performance testing and non-performance checks. The performance tests are defined as being conducted with a chassis type of brake dynamometer and with static vehicle tests. The non-performance checks include visual checks under the vehicle and under the hood, and a series of checks requiring vehicle wheel removal. These non-performance checks are to identify degraded or damaged brake system components that do not affect current performance but will affect performance in the future. The brake dynamometer is to be a low speed roller type machine that is capable of generating high brake retarding force loads. The machine is to feature controlled test inputs, pedal force levels and application rates and automatic data processing and readout.

HS-800 963

PASSENGER VEHICLE AND LIGHT-TRUCK BRAKING SYSTEMS INSPECTION EQUIPMENT.

PHASE 1. VOL. 2. FINAL REPORT

Bendix Res. Labs., Southfield, Mich.

T. W. Keranen, A. E. Sisson, P. Bounds 1973 277p refs Rept.

No. PB-225 348, BRL-TR-73-6784

Contract DOT-HS-090-2-477

Rept. for 26 Jun 1972-13 Aug 1973. Vol. 1 is HS-800 963.

NTIS

Leakage, Brake systems, Inspection equipment, Inspection standards, Brake dynamometers, Brake tests, Brake inspection, Brake fluid tests, Performance tests, Data processing, Wheel inspection, Axle loads, Vehicle weight, Tire tests, Brake fade, Pedal force, Horsepower, Tire brake force, Hydraulic brakes, Brake linings, Analog computers

The program determined the methods and specifications for a brake system inspection system. Also accomplished on the program was an evaluation of existing inspection equipment. The brake inspection criteria developed defines a need for performance testing and non-performance checks. The performance tests are defined as being conducted with a chassis type of brake dynamometer and with static vehicle tests. The non-performance checks include visual checks under the vehicle, and a series of checks requiring vehicle wheel removal. These non-performance checks are to identify degraded or damaged brake system components that do not affect current performance but will affect performance in the future. The brake dynamometer is to be a low speed roller type machine that is capable of generating high brake retarding force loads. The machine is to feature controlled test inputs, pedal force levels and application rates and automatic data processing and readout.

HS-800 964

5C. Cycles**A LOOK AT MOTORCYCLE ACCIDENTS IN 1972**

Traffic Safety v73 n12 p16-8, 39-40, 42 (Dec 1973)

B. Carraro 1973

See serial citation

Motorcycle accidents, Motorcycle operator fatalities, Motorcycle operator injuries, Motorcycle safety, Accident prevention, Helmets, Motorcycle visibility, Motorcycles, Vehicle motorcycle collisions, Motorcycle registration, Vehicle registration,

Motor scooter, Driver age, Motorcycle operator experience, Vehicle weight, Motorcycle laws, Speed, Time of accidents

The number of motorcycles in the U. S. is continuing to rise sharply. Deaths of motorcycle riders increased 16 percent in 1972 over 1971. Passenger cars were involved in more than their due share of total accidents, and motorcycles in less. However, passenger cars were involved in less than their share of fatal accidents, while motorcycles were involved in more. This could be due to less bodily protection for the motorcyclist, and inconsistency of laws governing helmets and protective devices throughout the states. Accidents are analyzed for 1972 and recommended safety measures are enumerated.

HS-013 921

SAFER DESIGNS URGED FOR MOTORCYCLES AND RECREATIONAL VEHICLES

Automotive Engineering v81 n9 p49-55 (Sep 1973)

J. P. Covington 1973

Based on International Congress on Automotive Safety (2d) Proceedings, sponsored by the National Motor Vehicle Safety Advisory Council.

See serial citation

Motorcycle safety, Recreational vehicle safety, Safety design, Crashworthiness, Design standards, Occupant protection, Antiskid brakes, Load bearing capacity, Motorcycle tires, Vehicle dynamics

Motorcycles and recreational vehicles (RV's) are studied with the idea of improving their safety. For motorcycles this includes antiskid brakes, improved traction tires, improved headlamps, conspicuity, windshields, rear vision devices, wheels, control cable strength and reliability, and crashworthiness. For RV's, areas to be studied include load carrying ability, gas supply cutoffs, brakes, steering, seat restraints, and crashworthiness.

HS-013 927

NEAR TERM SAFETY IMPROVEMENTS FOR MOTORCYCLES. FINAL REPORT

AMF Inc., White Plains, N. Y.

J. Bartol, G. D. Livers, N. R. Hirsch 1973 72p Rept. No.

B24-101-73, PB-227 055

Contract DOT-HS-257-3-584

Report for Sep 1972-Jun 1973. Prepared in cooperation with Harley-Davidson Motor Co., Inc., Milwaukee, Wis.

NTIS

Motorcycle safety, Impact protection, Motorcycle accidents, Motorcycle operator injuries, Side impact bars, Side impact collisions, Motorcycle design, Side impact tests, Tire failures, Cables, Fatigue tests, New York (State), Motorcycle operation fatalities, Vehicle motorcycle collisions, Anthropomorphic dummies, Motorcycle tires

The basic purpose of the work was to enhance motorcycle safety by investigating several critical safety areas and developing new and improved features to counteract these hazards. Specifically, the studies covered the following safety aspects: side impact protection, including problem definition, generation and evaluation of concepts, design, fabrication and testing of the best concepts, and evaluation of test results; dynamic tire failure, related to the hazard resulting when a tire experiences sudden failure and tends to separate from the rim; control cable strength and reliability requirements, aimed at investigating the frequency and consequences of cable failures, and developing

and applying a test procedure so that cables currently in use could be evaluated for strength and reliability, and preliminary requirements could be recommended.
HS-800 971

5D. Design

AN EVALUATION OF SIDE-GUARD DOOR BEAMS

HIT Lab Reports v3 n10 p1-7 (Jun 1973)
F. L. Preston, R. M. Shortridge 1973 9refs
See serial citation

Side impact bars, Side impact collisions, Safety devices, Lateral intrusion, Injury prevention, Occupant protection, Crushing, Door systems, Impact protection, Restraint system usage, Injuries by seat occupation

This article reports on an evaluation of the injury-reducing effects of side-guard door beams based on accident investigation reports. The evaluation considers two measures of effectiveness: the mean injury severity recorded for the occupants, and the degree of deformation in the door. In each case the analysis controls on contributing factors such as occupant seating location, restraint use, side of the car damaged, and the angle of the impact force. In both cases, results show that it cannot be concluded that side-guard door beams produce an effect on injuries, or on door penetration.

HS-013 902

TECHNICAL REVIEW. PART 1: SUSPENSION, TYRES, BRAKES AND ELECTRONICS

Auto Car v139 n4038 p58-61 (25 Oct 1973)
G. Howard 1973
See serial citation

Innovation, Suspension systems, Tires, Brakes, Electronic devices, Vehicle design, Sound absorbing materials

The article takes a retrospective look at developments in design and new trends in automobile systems as seen at the London Motor Show in 1973. Totally new cars are economically unfeasible, most companies using standard or established engines and transmissions in new bodies with revised suspensions or re-engineing an existing model. Part one examines suspension systems, tires, brakes, and electronics.

HS-013 908

A METHODOLOGY FOR MEASUREMENT OF VEHICLE PARAMETERS USED IN DYNAMIC STUDIES

National Aeronautical Establishment, Ottawa, Ont. (Canada)
G. L. Basso 1973 53p 11refs Rept. No. PB-226 899, NRC-13497, MS-134
Includes abstract in French.
Corporate author

Vehicle dynamics, Test equipment, Moments of inertia, Vehicle center of gravity, Measurement, Simulation, Suspension system design, Roll, Equations, Dynamic tests, Statistical analysis, Parameters, Systems engineering, Air bearings, Vehicle center of gravity, Rear axles, Rear suspension systems, Front suspension systems, Vehicle stability, Pitch, Yaw, Inertia dynamometers, Vehicle characteristics, Computerized simulation, Mathematical models

An experimental system has been developed to facilitate the measurement of vehicle parameters required in dynamic studies

of the automobile. This report describes the measuring facilities comprising, basically, a configuration of air bearings. System requirements are outlined based on the methodology adopted for studies involving the vehicle-occupant-terrain-obstacle system. Several procedures and techniques used to measure vehicle suspension and inertial characteristics are also outlined. System performance is illustrated by typical measurements made on a vehicle used in a program of studies directed towards the development of a validated model of the highway cable barrier for parametric studies of vehicle redirection using digital simulation.
HS-013 922

AUTOMOTIVE MATERIALS TRENDS--FROM STEEL TO STEEL

Automotive Engineering v81 n9 p56-60 (Sep 1973)
L. F. Looby 1973
See serial citation

Automobile materials, Steels, Experimental vehicles, Bumper design, Strength (mechanics), Exhaust emissions control devices, Chassis design, Automotive engineering, Safety cars, Engine design, Energy absorption

Perhaps by the mid 1980's as much as 80% of the car's weight may be materials not on the market today. Changes to the automobile will be motivated by new government standards and public demands for safety, decreased repair cost, pollution decrement, and more efficient and economic operation of the vehicles. An example of how these affect materials is presented utilizing the 5-mph bumper problem. Other examples of the necessity for development of high-strength steels are briefly summarized.

HS-013 928

REGULATION COMPLIANCE STILL DOMINATES NEW CAR ENGINEERING

Automotive Engineering v81 n10 p25-32, 67 (Oct 1973)
J. P. Covington 1973
See serial citation

Automobile design, Safety standards compliance, Exhaust emission control, Engine design, Impact attenuation, Occupant protection, Automotive engineering, Battery design, Experimental engines, Crashworthiness, Energy absorbing bumpers

1974 MODELS SHOW THAT FEDERAL REQUIREMENTS ON EMISSIONS, DAMAGEABILITY AND OCCUPANT PROTECTION CONTINUE TO DIRECT THE MAJOR ENGINEERING ENERGIES OF U.S. automakers. Other major trends include radial tire suspensions, metrication, high temperature underhood components and more lightweight materials.

HS-013 929

THE TAXICAB: A DESIGN CHALLENGE AND INDUSTRY TESTBED

Automotive Engineering v81 n10 p33-8 (Oct 1973)
J. P. Covington 1973
See serial citation

Taxicabs, Automobile design, Taxicab usage, Fleet management, Commercial vehicles, Automobile modification

Taxicabs face an environment far more punishing than the average vehicle. The taxidriver is hard on his car and special vehicles are too costly. A 'taxi package' offered by many manu-

Group 5D—Design

facturers is discussed. In some cases suspensions are stiffer, transmissions get a larger case, and heavier upholstery and floor mats are added. Generally, the taxi version is similar to the police version but with a smaller engine. Special seating problems are being worked on, as is a heavy duty frame. What it takes to keep a fleet operational is discussed.

HS-013 930

WHY DO CARS RUST?

Automotive Engineering v81 n12 p34-8 (Dec 1973)

Anonymous 1973

Based on Cars Go Rusty, by Svensk Bilprovning A.B., Stockholm.

See serial citation

Corrosion, Automobiles, Water effects, Floors, Galvanic corrosion, Fatigue (materials), Pitting, Corrosion prevention, Concentration cell corrosion

An analysis of corrosion, particularly of the structural parts of cars, shows that: a relatively small number of characteristic types of corrosion recur in most cases; the causes of corrosion are the same for most of the cars examined; corrosion is mainly confined to a limited number of components in each car model.

HS-013 933

INTERNATIONAL TECHNICAL CONFERENCE ON EXPERIMENTAL SAFETY VEHICLES (4TH), KYOTO, JAPAN, 13-16 MARCH 1973

National Hwy. Traf. Safety Administration, Washington, D. C.

Anonymous 1973 655p Rept. No. PB-226 892

Includes HS-013 940-HS-013 955

GPO

Experimental automobiles, Safety cars, Conferences, Vehicle handling, Accident avoidance, Tires, Brakes, Accident severity index, Anthropometric dummies, Impact tests, Seat belts, Crashworthiness, Air bag restraint systems, United States, Japan, West Germany, Great Britain, Italy, France, Sweden, Belgium, Netherlands, Foreign automobiles, Committee on the Challenges of Modern Society

Status reports by government representatives on their experimental safety vehicle programs are presented. The United States, Japan, Federal Republic of Germany, United Kingdom, Italy, France, Sweden, Australia, Spain, Belgium, and the Netherlands participated. Technical reports are presented by each of the countries. Seminars on accident avoidance and crashworthiness are included as are several presentations on future safety standards and the experimental safety vehicle program.

HS-013 939

CONFERENCE OPENING OF INTERNATIONAL TECHNICAL CONFERENCE ON EXPERIMENTAL SAFETY VEHICLES (4TH). PT. 1. INTRODUCTION

HS-013 939, International Technical Conference on

Experimental Vehicles (4th), Washington, 1973 pl-6

G. G. Mannella, N. Ohta, J. M. Beggs, E. Toyoda, D. W. Toms 1973

In HS-013 939

Experimental automobiles, Safety cars, Conferences, Vehicle safety, International factors, Committee on the Challenges of Modern Society

Short statements by Dr. Gene G. Mannella, National Highway Traffic Safety Administration; Dr. Nobuto Ohta, Ministry of International Trade and Industry; James M. Beggs, Office of the Secretary of Transportation; Eliji Toyoda, Japan Automobile Manufacturers Association, and Douglas W. Toms, National Highway Traffic Safety Administration, welcoming the Conference participants.

HS-013 940

CONFERENCE OPENING OF INTERNATIONAL TECHNICAL CONFERENCE ON EXPERIMENTAL SAFETY VEHICLES (4TH). PT. 2, STATUS REPORTS BY GOVERNMENT REPRESENTATIVES ON THEIR EXPERIMENTAL SAFETY VEHICLE PROGRAMS.

HS-013 939, International Technical Conference on Experimental Vehicles (4th), Washington, 1973 p7-25

J. M. Beggs, Y. Nakamura, H. Wagner, H. Taylor, A. Sirignano, M. Frybourg, G. Ekberg, J. DeCoster, J. G. Kuiperbak 1973

In HS 013 939

Experimental automobiles, Safety cars, Conferences, United States, Japan, West Germany, Great Britain, Italy, France, Sweden, Netherlands, Belgium, Foreign automobiles, Highway Safety programs, Committee on the Challenges of Modern Society

Status reports by government representatives on their experimental safety vehicle programs are presented. The United States is concerned with the total safety vehicle program; Japan with the vehicles designed by Toyota, Nissan, and Honda; Germany with vehicles designed by Daimler-Benz, Volkswagenwerk, BMW, Opel, and Porsche; the United Kingdom with the study of road accidents, safety standards, and prototype safety car construction; Italy with the study of road accidents and a prototype of the Fiat; France in studying passive restraint devices, accidents, and experimental vehicle realization; Sweden discusses steerability during emergency braking; Belgium is concerned with pedestrian safety; and the Netherlands, although not participating actively in the ESV project, is in full support.

HS-013 941

TECHNICAL PRESENTATION. PT. 1, THE JAPANESE TECHNICAL PRESENTATIONS

HS-013 939, International Technical Conference on Experimental Vehicles (4th), Washington, 1973 p31-80

K. Yamoto, T. Hasegawa, T. Baba, A. Wada, J. Kawano, S. Fujita, N. Marumo, Y. Serisawa, K. Kawashima, H. Hayano, A. Irimajiri 1973

In HS-013 939

Experimental automobiles, Safety cars, Steering, Vehicle handling, Braking, Body design, Impact tests, Energy absorbing frames, Vehicle safety, Tire characteristics, Accident avoidance, Energy absorbing bumpers, Vehicle vehicle impact tests, Bumper tests, Side impact tests, Rear end impact tests, Front end impact tests, Crashworthiness, Occupant protection, Automatic seat belts, Air bag restraint systems, Four wheel brakes, Dual brakes, Antiskid brakes, Energy absorbing systems, Hydraulic brakes, Japan, Toyota Motor Co., Nissan Motor Co., Honda Motor Co., Tire tests, Vehicle kinematics, Skid control, Brake dynamometer, Deceleration, Braking forces, Pedal force, Acceleration, Yaw, Conferences, Brakes, Injury prevention, Energy absorbing steering columns, Vehicle acceleration tests, Occupant kinetics, Rear visibility, Warning

systems, Restraint systems, Doppler effect, Pedestrian vehicle interface, Pedestrian safety, Vehicle pedestrian collisions, Body weight, Japanese vehicles, Tire failures

Technical presentations are made by the Japanese; Toyota, Nissan, and the Honda Motor Company are represented. The Toyota Motor Company outlines their ESV program with special attention to braking, handling and steering, and their energy management system. The Nissan Motor Company outlines the development, evaluation, and future safety considerations of their ESV program. The Honda Motor Company outlines the present development status of their ESV with special attention to the structure, accident avoidance, and the tires and brakes. HS-013 942

TECHNICAL PRESENTATIONS. PT. 2. THE FEDERAL REPUBLIC OF GERMANY TECHNICAL PRESENTATION

HS-013 939, International Technical Conference on Experimental Vehicles (4th), Washington, 1973 p81-153
H. Wagner, H. Scherenberg, B. Felzer, H. Willumeit, M. Danner 1973 refs
In HS-013 939

Experimental vehicles, Safety cars, Impact tests, Occupant kinematics, Occupant protection, Structural foams, Suspension systems, Wheel mounting, Shock absorbers, Restraint systems, Brakes, Steering, Conferences, Friction brakes, Hydraulic brakes, Front axles, Rear axles, Windshield washers, Windshield wipers, Instrument panel design, Vehicle design, Kinetic energy, Speed studies, Accident research, Benefit cost analysis, Accident simulation, Front end impact tests, Yaw, Crashworthiness, Accident investigation, West Germany, Daimler-Benz A.G., Opel (Adam) A.G., Porsche, Volkswagenwerk A.G., HUK-Verband (West Germany), Rear end impact tests, Side impact tests, Occupant vehicle interface, Energy absorption, Barrier impact forces, Safety seat design, Prototypes, Lateral acceleration, Rollover tests, Vehicle lighting

Daimler-Benz, Opel, Porsche and Volkswagenwerke are represented in presentation made by West Germany. Daimler-Benz discusses their Mercedes-Benz ESV ESF-22; data on the car itself and impact test results are presented in summary form. Opel discusses their 2,000 pound ESV with their priorities being frontal impacts, rollovers, side impact and rear impact; work is being done on foam-filled structural elements. Porsche presents studies on the problem of an automatic adjustment of the wheel position to different driving conditions by introducing elasticity without affecting the wheel suspension in question. Volkswagen presents a detailed study of their ESV including the vehicle description and test results as well as a benefit cost analysis and future evaluations. The Accident and Motor Traffic Insurers present results of their research on interior safety of automobiles.

HS-013 943

TECHNICAL PRESENTATIONS. PT. 3. THE FRENCH TECHNICAL PRESENTATION

HS-013 939, International Technical Conference on Experimental Vehicles (4th), Washington, 1973 p155-232
M. Frybourg, C. Berlioz, G. Boschetti, J. Hamon, C. Prost-Dame, P. Ventre, M. Clavel, S. Bohers 1973 refs
In HS-013 939

Experimental vehicles, Safety cars, Accident analysis, Accident statistics, Accident studies, Driver vehicle interface, An-

tilocking devices, Braking, Restraint systems, Occupant protection, Feasibility studies, Accident severity, Conferences, Driver age, Driver injuries, Vehicle classification, Accident case reports, Benefit cost analysis, Accident avoidance, Statistical analysis, Accident types, Road conditions, Vehicle characteristics, Mileage range, Police reports, Accident costs, Safety programs, European vehicles, Impact tests, Anthropomorphic dummies, Reinforcement (structures), France, Renault-Peugeot Assoc., Citroen S.A., Side impact collisions, Front end impact tests, Impact velocity, Deceleration tests, Single vehicle accidents, Vehicle vehicle collisions, Vehicle pedestrian collisions, Barrier impact forces, Rear end impact tests, Safety seats, Restraint systems, Passive restraint systems, Rollover accidents, Deformation analysis, Structural deformation analysis, Kinetic energy, Compatibility

The French Ministry of Transport presents traffic safety comparisons of various classes of common car makes and drivers; the Ministry of Equipment and Housing discusses the a priori effectiveness of antiskid brakes; Peugeot-Renault discusses their safety car with an eye to cost-efficiency, reviews the rating of accident severities of occupants and the necessary restraint devices, and proposes a test evaluation of compatibility between very different passenger cars; Citroen presents results of impact tests utilizing anthropometric dummies and suggests modifications.

HS-013 944

TECHNICAL PRESENTATIONS. PT. 4. THE UNITED KINGDOM TECHNICAL PRESENTATION

HS-013 939, International Technical Conference on Experimental Vehicles (4th), Washington, 1973 p233-276
H. Taylor, P. S. Warner, P. Finch, M. Macaulay 1973 refs
In HS-013 939

Experimental vehicles, Safety cars, Impact tests, Braking, Vehicle handling, Pedestrian safety, Anthropomorphic dummies, Occupant protection, Seat belt effectiveness, Restraint system effectiveness, Great Britain, Side impact tests, Vehicle barrier collisions, Injury tolerances, Brake systems, Brake tests, Antilocking devices, Friction tests, Vehicle lighting, Visibility, Durability, Pedestrian vehicle interface, Human body simulation, Anthropomorphic dummy standardization, Head impact tests, Chest impact tolerances, Lumbar spine, Accelerometers, Human body kinetics, Barrier collision tests, Front end impact tests, Occupant protection, Restraint systems, Injuries, Seat belt positioning, Passive restraint systems

The Transport and Road Research Laboratory of Great Britain presents requirements for a practical safety car. The Motor Industry Research Association details specifications for an anthropomorphic dummy (including instrumentation) and discusses the development and improvement of impact test methods. British Leyland gives a progress report on the British Leyland/TRRL experimental safety subsystem projects dealing with frontal impacts, side impacts, and occupant protection. Auto Restraints Systems, Ltd. reviews seat belt effectiveness and investigates potential improvements including passive systems.

HS-013 945

HOW TO USE A LIGHTWEIGHT POWERPLANT TO INCREASE PAYLOAD

Janeway Engineering Co., Troy, Mich.
For primary bibliographic entry see Fld. 5T.
HS-013 961

Group 5D—Design

TRUCK CHASSIS COMPONENT REDESIGN TO REDUCE WEIGHT

General Motors Corp., Pontiac, Mich.
For primary bibliographic entry see Fld. 5T.
HS-013 962

MULTI-PURPOSE COLLISION TRAJECTORY SENSING

For primary bibliographic entry see Fld. 1C.
HS-013 969

EXPERIMENTAL SAFETY VEHICLE TRADEOFF AND INTEGRATION SYSTEMS STUDIES. VOL. 1. SECT. 1 THROUGH 5. FINAL REPORT

American Machine and Foundry Co., Santa Barbara, Calif.
Anonymous 1973 804p refs Rept. No. PB-226 635,
ASL-TIS-103-Vol-1
Contract DOT-HS-257-2-514
Report for Aug 72-Jul 73. Vol. 2 is HS-800 923.
NTIS

Experimental automobiles, Safety cars, Air bag restraint systems, Seat belts, Bumper design, Crashworthiness, Simulators, Automobile interior design, Body design, Safety design, Vehicle dynamics, Air belt restraint systems, Occupant protection, Knee restraints, Computerized simulation, Accident simulation, Angle impact tests, Passive restraint systems, Barrier collision tests, Restraint system tests, Energy absorbing materials, Test equipment, Front end impact tests, Rear seat belts, Noise, Webbing, Air bag inflation devices, Energy absorbing front structures, Acceleration response, Acceleration, Pole impact tests, Deflection, Head on impact tests, Energy absorbing bumpers, Mathematical models, Impact forces, Energy absorbing side structures, Energy absorbing rear structures, Vehicle vehicle impact tests, Accelerometers, Strain gauges, Vehicle simulators, Data analysis, Vehicle aggressivity, Toxicity

This volume is comprised of five sections: a summary giving 11 major study areas and describing study goals, methods, and principal results; interior studies, describing air bag systems developed for front seat occupants, and inflatable seat belts for rear seat occupants; front energy management, describing velocity-sensitive front end systems, bumpers, and aggressivity studies; body structure studies, describing structural features to provide crashworthiness in the principal collision modes; and vehicle simulator, describing the development and testing of a vehicle which simulates various front end crush characteristics. The principal technical results are: a crashworthy design can limit occupant decelerations to 32 g's in a barrier crash at 45 mph; the same design can survive rear impacts at 35 mph, side impacts at 30 mph, and front angular impacts at 30-35 mph; and air bags and inflatable seat belts provide satisfactory front and rear occupant protection respectively at frontal impacts up to 45 mph.
HS-800 922

EXPERIMENTAL SAFETY VEHICLE TRADEOFF AND INTEGRATION SYSTEMS STUDIES. VOL. 2. SECT. 6 THROUGH 12. FINAL REPORT

American Machine and Foundry Co., Santa Barbara, Calif.
Anonymous 1973 911p refs Rept. No. ASL-TIS-103-Vol-2,
PB-226 634
Contract DOT-HS-257-2-514
Rept. for Aug 1972-Jul 1973. Portions of this study were subcontracted to Bendix Res. Labs. and Budd Co. Vol. 1 is HS-800 922.
NTIS

Experimental automobiles, Safety cars, Vehicle dynamics, Computerized simulation, Mathematical models, Crashworthiness, Vehicle weight, Rear visibility, Restraint system design, Engine performance, Braking, Weight distribution, Plastics, Parameters, Yaw, Velocity, Vehicle center of gravity, Barrier collision tests, Pole impact tests, Front end impact tests, Side impact tests, Rear end impact tests, Computer programs, Periscopic rearview mirrors, Seat design, Occupant protection, Human factors engineering, Sensors, Radar, Rear viewing devices, C pillars, Automobile design, Antiskid brakes, Brake tests, Brake failures, Automobile manufacturing, Head restraint design, Angle impact tests, Passive restraint systems, Air bag restraint systems, Restraint system effectiveness, Entering and leaving automobiles, Escape from vehicle, Noise, Toxicity, Accident avoidance, Gas turbine engines, Wankel engines, V 8 engines, Aluminum alloys, Front wheel drives, Rear wheel drives, Brake performance, Brake proportioner systems, Brake system design, Steels, Joints, Automobile materials, Economic factors, Mechanical properties

This volume is comprised of seven sections: vehicle dynamics math simulation, describing the effect of front/rear weight distribution on dynamic performance; crashworthiness-weight tradeoff, describing crashworthy weight variations as a function of collision mode; rear visibility tradeoffs, reporting studies of see-through headrests and the implications of C post removal; occupant restraint tradeoffs, rating competing concepts for occupant protection; engine effects on safety performance, considering V-8, gas turbine, and rotary engines; braking performance analysis, rating two groups of antiskid and non-antiskid braking systems, including brake proportioning auxiliaries; and producibility, describing present and future producibility criteria, and the weight and probable cost increment of a producible, crashworthy ESV autobody. The final design in its producible version weighs about 4400 lb. and provides crashworthiness and front and rear occupant protection in barrier crashes up to 45 mph, plus redundant 4-wheel antiskid braking systems for a standard five-passenger family sedan.
HS-800 923

FORD EXPERIMENTAL SAFETY VEHICLE. FINAL REPORT

Ford Motor Co., Dearborn, Mich.
Anonymous 1973 102p Rept. No. PB-226 232
Contract DOT-OS-20005
Rept. for 21 Jul 1971-30 Apr 1973.
NTIS

Experimental automobiles, Safety cars, Occupant protection, Vehicle design, Crashworthiness, Prototypes, Safety design, Economic factors, Ford Galaxie, Accident avoidance tests, Restraint system tests, Chassis design, Energy absorbing systems, Impact attenuation, Sensors, Steering systems, Suspension systems, Brake systems, Impact tests, Hydraulic equipment, Automobile dimensions, Vehicle weight

The objectives, rationale, design descriptions, and test program of the Ford Experimental Safety Vehicle are summarized. A production Ford Galaxie was used as a starting point for the design, which was modified several times to meet safety requirements for a practical ESV. The initial work phase included construction, test, and development of several subsystems and crash tests of 3 baseline vehicles and 11 prove-out tests. Phase II testing and development included construction and testing of 8 prototype vehicles followed by fabrication and building of 2 complete prototype ESV's. Results showed

that reaching or approaching performance specifications meant highly experimental designs, substantial penalties in weight and cost. The program produced valuable information as to the feasibility of various approaches for improving occupant safety, and provided an important basis for developing more realistic ESV programs.

HS-800 980

AMF AND FIAT ESV'S - VEHICLE TO VEHICLE IMPACT TESTS. FINAL REPORT

Dynamic Science, Phoenix, Ariz.

Anonymous 1973 125p Rept. No. PB-225 836, 2310-73-61

Contract DOT-HS-046-2-468

NTIS

Vehicle kinematics, Automobile models, Safety cars, Structural design, Vehicle performance, Experimental automobiles, Safety engineering, Automobile bodies, Front end impact tests, Vehicle acceleration tests, Rear end impact tests, Accelerometers, Postcrash phase, Acceleration, Energy absorption, Vehicle vehicle impact tests, High speed impact tests, Vehicle weight, Crashworthiness

A 75-mph closure front-to-front impact test and a 60-mph front-to-rear impact test were conducted by Dynamic Science between a 1,500-pound class Fiat Experimental Safety Vehicle (ESV) and a 5,200-pound AMF Inc. ESV. The objective of these tests was: to determine the structural response of the Fiat ESV when involved in collisions with a larger ESV and to determine the ability of the velocity-sensitive front end of the AMF ESV to accommodate lightweight vehicles. A theoretical energy absorption analysis was conducted for the front-to-front test.

HS-800 981

5F. Fuel Systems

THE EFFECT OF FUEL COMPOSITION ON ATMOSPHERIC AEROSOL DUE TO AUTO EXHAUST

Journal 06Journal of the Air Pollution Control Association v23 n11 p949-56 (Nov 1973)

W. E. Wilson, Jr., D. F. Miller, A. Levy, R. K. Stone 1973 8refs
See serial citation

Fuel composition, Exhaust emissions, Aerosols, Air pollutants, Leaded gasoline, Lead free gasoline, Aromatic hydrocarbons, Carbon monoxide, Nitrogen oxides, Light scattering, Exhaust composition, Smog

In this study, investigation was made of possible effects of motor-fuel composition on the formation of primary and secondary aerosols. Determination of both aerosols was based on light-scattering measurements. It is concluded that, based on current exhaust-aerosol data, the utilization of an aerosol-reactivity ranking of the pure hydrocarbons is an inadequate approach to predict secondary-aerosol-forming potential of the exhaust.

HS-013 913

A REPORT ON AUTOMOTIVE FUEL ECONOMY

Environmental Protection Agency, Washington, D. C.

Anonymous 1973 42p 5refs Rept. No. PB-226 902

Corporate author

Fuel economy, Vehicle weight, Engine design, Driving style effect on exhaust emissions, Exhaust emission control devices,

Compression ratio, Air conditioning, Automatic transmissions, Tire rolling resistance, Tire inflation pressure, Speed, Trip length, Environmental factors, Vehicle age

Fuel economy was calculated for 4,000 cars. The effect of various design parameters on fuel economy was determined by statistical regression techniques. Vehicle weight is the most important vehicle design parameter affecting fuel economy. Changes in design parameters including weight affected fuel economy from -50% to +100% of the nationwide average fuel economy. Other parameters varied were emission controls, air conditioning, automatic transmissions, compression ratios, and vehicle operation.

HS-013 917

CALIFORNIA LOOKS AT AUTOMOTIVE EMISSIONS

Automotive Engineering v81 n10 p52-6 (Oct 1973)

R. L. Chass 1973

See serial citation

Exhaust emissions, Air quality standards, Statistics, Ozone, Carbon monoxide, Nitrogen oxides, Eye irritation, Sulfur dioxide, Los Angeles (Calif.), Forecasting, Vehicle air pollution

Automotive emissions in Los Angeles since 1965 are reviewed. Ozone, carbon monoxide, nitrogen oxides and eye irritation have all been reduced. Statistics substantiating this are presented. Predictions are made as to when air quality standards will be met.

HS-013 932

OPERABILITY OF AUTOMOTIVE DIESEL EQUIPMENT AT TEMPERATURES BELOW FUEL CLOUD POINT

Esso Res. and Engineering Co., Linden, N. J.

N. Feldman 1973 10p 4refs Rept. No. SAE-730677

Presented at Combined Commercial Vehicle Engineering and Operations and Powerplant Meetings, Chicago, 18-22 June 1973. SAE

Fuel additives, Fuel mixture temperature, Diesel fuels, Low temperature fluidity, Fuel flow, Cold weather tests, Engine operating conditions, Filterability

The use of wax-crystal modifiers for improving low-temperature operability of diesel fuel has not been possible in the United States because the large crystals could not penetrate the very fine porosity of fuel filters. The development of new, extremely potent additive packages has solved this problem by reducing the size of the crystals precipitated in the diesel fuel. The smaller size allows them to pass through the fine filters of auto-diesel equipment at temperatures well below the cloud point, even under extreme field conditions. On the basis of successful testing of additive-treated diesel fuel, cloud point can no longer be considered as an indication of operability limit in auto-diesel equipment. It is desirable, therefore, to develop a laboratory flow test that predicts the field performance of diesel fuels-flow improved or not-and accept it as the basis for a new operability guideline for diesel fuel equipment.

HS-013 963

HOT CORROSION OF DIESEL ENGINE EXHAUST VALVES

Caterpillar Tractor Co., Peoria, Ill.

A. Chaudhuri 1973 10p 18refs Rept. No. SAE-730679

SAE

Group 5F—Fuel Systems

Corrosion, Exhaust valves, Diesel engine exhaust emissions, Sulfur oxides, Diesel fuels, Nickel alloys, Steels, Oxidation, Valve deposits, Sulfidation

The purpose of this paper is to show that although 'hot corrosion' (which is, in fact, a sulfidation-accelerated oxidation phenomenon) is more prevalent in gas turbine applications, diesel engines are not immune to this under certain conditions. Evidence of this type of corrosion in the case of some iron-base and nickel-base exhaust valves is presented to illustrate the point. The successive stages of the corrosion process are discussed, and the beneficial effects of some alloying elements in affording protection against hot corrosion are pointed out.
HS-013 965

5I. Inspections

BENEFITS OF MODERN DIESEL ENGINE DIAGNOSTIC TOOLS IN FLEET MAINTENANCE AND ENGINE TESTING OF FUELS AND LUBRICANTS

Mobile Res. and Devel. Corp., New York; Mobil Oil Corp., New York
C. R. Forsman, W. R. Schwindeman 1973 10p 1ref Rept. No. SAE-730678

Presented at Combined Commercial Vehicle Engineering and Operations and Powerplant Meetings, Chicago, 18-22 Jun 1973.
SAE

Engine diagnostic equipment, Automated inspection equipment, Diesel engines, Engine maintenance, Engine inspection, Inspection effectiveness, Engine compression tests, Fleet management, Preventive maintenance

Modern electronic diagnostic equipment, which displays fuel injection pressure curves, combustion pressure patterns and compression quality, has been used to improve the reliability and repeatability of laboratory engine tests used for lubricant development and evaluation. Major savings in man hours per test engine and greater availability have been obtained, along with great improvement in test repeatability. The same equipment used in fleet maintenance has provided significant savings by detecting incipient breakdowns in time to make repairs and avoid engine replacement and on-the-road failures. The fleets tested showed 10-25% of the vehicles had specific malfunctions which could produce costly failures if not immediately repaired.
HS-013 964

VEHICLE MILEAGE EXPOSURE STUDY. FINAL REPORT

New York (State) Dept. of Motor Vehicles, Albany
D. B. Negri 1973 61p Rept. No. PB-225 335
Contract DOT-HS-245-2-476
Report for Sep 1973.
NTIS

Foreign automobiles, Automobile models, Vehicle mileage, Odometers, Vehicle inspection, Statistical analysis, Driver mileage, Driver age, Driver sex, Vehicle age, New York (State), Body types

This report analyzes mileage data obtained from vehicle inspection odometer readings in New York State during the period April 1, 1970 through March 1, 1972. Pt. 1 compares the result of estimating annual mileage by three different techniques. Pt. 2 uses average annual mileage for analysis by such variables as vehicle make/line and year, sex and age of owner, and vehicle

body. Results show that age of owner and vehicle age are strong factors in annual mileage; mileage for males was greater than for females; highest annual mileage by vehicle type was for the station wagon and lowest for the 2 door sedan; vehicles with highest mileage was the foreign car group and the lowest the compact cars.
HS-800 961

PASSENGER VEHICLE AND LIGHT-TRUCK BRAKING SYSTEMS INSPECTION EQUIPMENT. PHASE 1. VOL. 1. SUMMARY FINAL REPORT

Bendix Res. Labs., Southfield, Mich.

For primary bibliographic entry see Fld. 5A.

HS-800 963

PASSENGER VEHICLE AND LIGHT-TRUCK BRAKING SYSTEMS INSPECTION EQUIPMENT. PHASE 1. VOL. 2. FINAL REPORT

Bendix Res. Labs., Southfield, Mich.

For primary bibliographic entry see Fld. 5A.

HS-800 964

5J. Lighting Systems

ALL ABOUT AUXILIARY LAMPS

Road and Track v25 n4 p38-43 (Dec 1973)

J. Dinkle, R. Wakefield 1973

See serial citation

Auxiliary lamps, Headlamps, Vehicle lighting, Pencil beam front lamps, Running lamps, Headlamp tests, Visibility, Lighting tests, Brightness

Recommendations on selection of auxiliary lights are made following tests of 27 headlights manufactured by different companies. General rules for installation are given together with specifications, prices, vision measurements and relative performance of the driving lights tested.
HS-013 901

5N. Occupant Protection

AN EVALUATION OF SIDE-GUARD DOOR BEAMS

For primary bibliographic entry see Fld. 5D.

HS-013 902

EXPERIMENTAL SAFETY VEHICLE TRADEOFF AND INTEGRATION SYSTEMS STUDIES. VOL. 1. SECT. 1 THROUGH 5. FINAL REPORT

American Machine and Foundry Co., Santa Barbara, Calif.

For primary bibliographic entry see Fld. 5D.

HS-800 922

HUMAN IMPACT RESPONSE: MEASUREMENT, EVALUATION, AND SIMULATION. A BIBLIOGRAPHY

National Hwy. Traf. Safety Administration, Washington, D. C.

For primary bibliographic entry see Fld. 1B.

HS-820 305

50. Propulsion Systems

DESIGN AND DEMONSTRATION OF LOW EMISSION RANKINE CYCLE AUTOMOTIVE ENGINE USING ORGANIC FLUID AND TURBINE EXPANDER

Aerojet Liquid Rocket Co., Sacramento, Calif.

J. N. Hodgson, A. H. Kreeger 1973 11p

Contract EPA-68-04-0005

Presented at Intersociety Energy Conversion Engineering Conference (8th), Philadelphia, Pa., 13-17 Aug 1973.

Corporate author

Rankine cycle engines, Rankine cycle engine fluids, Engine design, Emission control, Engine performance, Exhaust emissions, Chevrolet Impala, Prototypes, Turbines, Vapor generators, Regenerators, Gear boxes, Pumps, Experimental engines

The Aerojet Liquid Rocket Company is developing an organic Rankine cycle automotive engine for the Environmental Protection Agency. The engine operates with a proprietary organic working fluid and a turbine expander. A supercritical thermodynamic cycle provides system stability and temperature uniformity for improved engine reliability. External combustion allows control over the heat input process to minimize exhaust pollutants. A preprototype engine configured to fit in a 1973 Chevrolet Impala has been built and tested. Emission levels were excellent, averaging about one-fourth of the 1975-76 Federal Standards. Predictions for the prototype engine in a vehicle indicate fuel economy and performance equivalent to current automotive engines.

HS-013 907

FORD IS READYING STIRLING ENGINE FOR TORINO-2

Automotive Engineering v81 n8 p42-5 (Aug 1973)

N. D. Postma, R. Van Giessel, F. Reinink 1973

See serial citation

Stirling engines, Low emission engines, Prototypes, Exhaust emission control, Gasoline mileage, Fuel economy, Experimental engines, Ford Torino, Engine performance

Ford and N.V. Philips of Holland have been cooperating in developing a 170-hp 4-cyl, double-acting swashplate Stirling engine to replace the 351 cu in. piston engine in the Torino intermediate passenger car. Although a prototype engine is being designed and built for installation in the 1975 Torino, it is not expected that low-volume production of passenger cars powered with Stirling engines can occur before 1982. Tests of the engine and projections showed that use of the engine cut emissions and fuel costs.

HS-013 924

RECIRCULATING JET SYSTEMS FOR GROUND VEHICLES

High Speed Ground Transportation Journal v7 n3 p369-80 (Fall 1973)

G. Mouritzen 1973 6refs

See serial citation

High speed ground transportation, Propulsion systems, Vehicle design, Air jets, Nozzles, Recirculation, Thrust, Vehicle dynamics, Mathematical models, Feasibility studies, Jet engines, Transfer functions

As concern grows regarding air pollution, noise, and vibration from ground vehicles, interest is increasing in passive vehicle

systems to replace internal combustion. Linear electric motors are seen as costly, requiring complex equipment, and inefficient at low speeds. Air or water impulse jet systems appear more advantageous than cryogenic, reduced pressure, or low drag pipe systems, and are discussed as a feasible alternative. Propulsion is obtained by impulses gained by turning a jet exhausted from stationary nozzles on the ground by vanes on the vehicle. Noise levels, pressures, and temperatures are low, costs are favorable, and the system may be built with existing technology. If the jet is completely reversed, is caught by a stationary turning vane on the ground, and recirculated 180 degrees to hit the vehicle turning vanes again it can produce thrust on the vehicle, and the process may be repeated several times. A mathematical model is developed and overall efficiency is described.

HS-013 970

5R. Steering Control Systems

THE EFFECTS OF THE DESIGN OF THE STEERING ASSEMBLY AND THE INSTRUMENT PANEL ON INJURIES (ESPECIALLY AORTIC RUPTURE) SUSTAINED BY CAR DRIVERS IN HEAD-ON COLLISION

For primary bibliographic entry see Fld. 1B.

HS-013 903

A NEW CONCEPT IN COMMERCIAL VEHICLE SUSPENSION

Chalmers Suspensions International Ltd., Montreal, Que. (Canada)

W. G. Chalmers 1973 10p 2refs Rept. No. SAE-730654

SAE

Suspension system design, Spring design, Vehicle riding qualities, Prototypes, Axles, Springs, Commercial vehicles, Vehicle handling, Vehicle stability, Heavy duty vehicles

Developed to cut down on maintenance costs and increase the earning power of the vehicle, this family of suspensions provides for improved vehicular behavior items such as stability, braking, cornering, and overall ride. The suspensions utilize a principle of providing a cushioned variable rate ride through the use of molded rubber springs. Floating walking beams distribute weight equally on both axles in the case of tandems. The axles are positively located by upper wishbones and lower torque rods. The parallelogram thus formed prevents windup and axle hop. The correct use of metals shows a substantial weight saving in the entire model range.

HS-013 957

5T. Trucks And Trailers

TRUCK NOISE 3B. ACOUSTIC AND PERFORMANCE TEST COMPARISON OF INITIAL QUIETED TRUCK WITH CONTEMPORARY PRODUCTION TRUCKS

Freightliner Corp., Portland, Oreg.

For primary bibliographic entry see Fld. 2G.

HS-013 904

WAS IT THE DRIVER-OR THE COMPANY? ANALYZING DRIVER ATTITUDES

For primary bibliographic entry see Fld. 3D.

HS-013 920

Group 5T—Trucks And Trailers

FMVSS 121--AIR BRAKE SYSTEMS. HOW IT AFFECTS TRACTOR-TRAILER COMBINATIONS

For primary bibliographic entry see Fld. 5A.
HS-013 926

SAFER DESIGNS URGED FOR MOTORCYCLES AND RECREATIONAL VEHICLES

For primary bibliographic entry see Fld. 5C.
HS-013 927

MOTOR CARRIER ACCIDENT INVESTIGATION. REFRIGERATED TRANSPORT CO., INC. ACCIDENT, MARCH 8, 1973, CARTERSVILLE, GEORGIA

Bureau of Motor Carrier Safety, Washington, D. C.
For primary bibliographic entry see Fld. 1C.
HS-013 937

MOTOR CARRIER ACCIDENT INVESTIGATION. MIDWEST FARM SUPPLY ACCIDENT, APRIL 28, 1973, COURTLAND, KANSAS

Bureau of Motor Carrier Safety, Washington, D. C.
For primary bibliographic entry see Fld. 1C.
HS-013 938

A NEW CONCEPT IN COMMERCIAL VEHICLE SUSPENSION

Chalmers Suspensions International Ltd., Montreal, Que. (Canada)
For primary bibliographic entry see Fld. 5R.
HS-013 957

DIAGNOSTIC LEVELS REQUIRED FOR HEAVY-DUTY VEHICLES

Ryder System, Inc., Miami, Fla.
T. Mannix 1973 6p Rept. No. SAE-730659
Presented at the Combined Commercial Vehicle Engineering and Operations and Powerplant Meetings, Chicago, 18-22 Jun 1973.
SAE

Heavy duty vehicles, Diagnostic equipment, Preventive maintenance, Commercial vehicles, Monitoring, Reliability, Economic factors, Warning systems, Vehicle inspection

This paper defines the need for more complete diagnostic systems as options for heavy commercial vehicles. Areas and indicators are defined for current and future operator requirements. Return on the operators investment is demonstrated on the basis of vehicle utilization. Current prototypes and pilot evaluations are discussed.
HS-013 958

PARAMETER STUDIES IN ARTICULATED VEHICLE HANDLING

IIT Res. Inst., Chicago, Ill.
R. L. Eshleman, T. M. Scopelite, S. DeSai 1973 8p 1ref Rept. No. SAE-730673
Contract DOT-HS-105-1-151
Presented at Combined Commercial Vehicle Engineering and Operations and Powerplant Meetings, Chicago, 18-22 Jun 1973.
SAE

Articulated vehicles, Tractor semitrailers, Vehicle performance, Braking, Steering, Vehicle stability, Mathematical models, Computerized simulation, Vehicle handling, Simulation models, Vehicle characteristics, Lane changing

This paper presents the results of a parameter variation study conducted on typical single- and double-articulated vehicles using the AVDS II computer simulation model. The vehicle dynamic responses and driver steering and braking response demands during 12 ft wide lane-change maneuvers are determined for varying discrete values of maneuver length, vehicle velocity, road-tire friction coefficient, fifth-wheel damping, vehicle geometry (fifth-wheel location), and vehicle loading. Effects of brake unbalance and aerodynamic loads on vehicle responses are also evaluated.
HS-013 959

ANALYTICAL-EXPERIMENTAL RESPONSE OF ARTICULATED VEHICLES

IIT Research Inst., Chicago, Ill.
R. L. Eshleman, S. DeSai, D. W. Hanify 1973 9p 2refs Rept. No. SAE-730674
Contract DOT-HS-105-1-151
Presented at the Combined Commercial Vehicle Engineering and Operations and Powerplant Meetings, Chicago, 18-22 Jun 1973.
SAE

Articulated vehicles, Tractor semitrailers, Vehicle performance, Braking, Steering, Vehicle stability, Vehicle road interface, Mathematical models, Computerized simulation, Dynamic tests, Road tests, Lane changing, Simulation models, Speed, Vehicle characteristics, Vehicle handling

Analytical-experimental studies were conducted on a tractor-semitrailer vehicle performing prescribed lane-change maneuvers. This paper shows the validation of the Articulated Vehicle Dynamics Simulation model (AVDS II) with full-scale tractor-semitrailer field tests. Experimental data on the tractor trajectory and braking were used as computer input, and the simulation model response results were compared with the vehicle responses from the experimental tests on a time-transient basis. Analytical-experimental validation is shown for varied vehicle speeds and braking during maneuvers.
HS-013 960

HOW TO USE A LIGHTWEIGHT POWERPLANT TO INCREASE PAYLOAD

Janeway Engineering Co., Troy, Mich.
R. N. Janeway 1973 16p Rept. No. SAE-730675
Presented at Combined Commercial Vehicle Engineering and Operations and Powerplant Meetings, Chicago, 18-22 Jun 1973.
SAE

Weight distribution, Load bearing capacity, Weight to power ratio, Body center of mass, Vehicle center of gravity, Gas turbine engines, Truck stability, Truck design, Vehicle riding qualities, Vehicle dynamics, Wheelbases, Engine weight, Fifth wheel couplers, Tractor semitrailers, Axle loads

This paper reviews the basic principles of weight distribution effects on vehicle ride to bring out the quantitative significance of the dynamic index. This criterion is then applied to the prediction of the consequences to riding quality of any combination of fifth-wheel offset and wheelbase, at constant axle loads. General equations are derived and their use is illustrated for the case of a typical tractor, with assumed powerplant weight reductions up to 2000 lb. The principal conclusions are: (1) Axle loads should be maintained by using the shortest possible wheelbase combined with slight increases in fifth-wheel offset. (2) powerplant location should be as far forward as possible, preferably ahead of front axle. (3) In general, the design objective in adapting a lighter powerplant should be to attain the highest possible dynamic index within practical limits.

April 26, 1974

VEHICLE SAFETY—Field 5

Wheel Systems—Group 5V

HS-013 961

TRUCK CHASSIS COMPONENT REDESIGN TO REDUCE WEIGHT

General Motors Corp., Pontiac, Mich.
F. O. Gadd 1973 11p Rept. No. SAE-730676
Presented at Combined Commercial Vehicle Engineering and Operations and Powerplant Meetings, Chicago, 18-22 Jun 1973.
SAE

Vehicle weight, Truck design, Aluminum, Chassis design, Fuel tanks, Battery cases, Front structures, Truck cabs, Economic factors

This paper discusses the means by which several major heavy-duty truck components have been redesigned from conventional material, such as malleable iron, nodular iron, or fabricated steel, to cast, stamped, extruded, or forged aluminum in order to reduce overall vehicle weight. Design life for lightweight parts had to meet the same criteria as the standard parts they replaced. All components discussed in this paper are available in current production trucks.

HS-013 962

5V. Wheel Systems

EFFECTS OF ROTATION PATTERNS ON TREAD LIFE EVALUATION

Tire Science and Technology v1 n4 p349-53 (Nov 1973)
F. C. Brenner, A. Kondo 1973 3refs
See serial citation

Tire rotation, Tire wear measurement, Tire tests, Front tires, Rear tires, Snow tires, Wear tests

The effects of making tread life evaluations using different patterns of rotation are reported. It is shown that the estimated average tread life for a tire was not statistically different in experiments with four tires in fixed wheel position, on fixed axles, or fully rotated to all wheel positions. The fully rotated procedure produced the same average for a pair of tires or for four tires; the variability of the data was significantly smaller than in the other rotation patterns.

HS-013 909

EFFECT OF POLYMER, ROAD SURFACE, AND DRIVING CONDITIONS ON WEAR SURFACE CHARACTERISTICS OF TIRE TREADS

Tire Science and Technology v1 n4 p354-62 (Nov 1973)
F. R. Martin, P. H. Biddison 1973 13refs
See serial citation

Tire materials, Tire treads, Tire performance, Tire wear, Tire pavement interface, Polybutadiene, Polymers, Concrete pavements, Gravel, Cornering, Scanning electron microscope, Synthetic rubber, Road surfaces, Bias belted tires

Treads made with emulsion styrene-butadiene copolymer (SBR), solution SBR, polybutadiene (BR), and a 60/40 emulsion SBR/BR mixture were built as four-way tread sections on G78-15 belted bias tires, which were driven over both concrete and gravel-textured highways and on a small, circular, concrete test track. The tires were front mounted. When driven on concrete highway, all except the BR tread had either crumbled-

or liquid-appearing surfaces, thought to have been formed by mechanical degradation or fatigue. When cornered on concrete, these materials formed small cylindrical particles or rolls. The BR tread had a smooth, granular-textured surface when driven on concrete highway and a ridge or sawtooth abrasion pattern when cornered on concrete. All the materials appeared rough and torn when run on gravel-textured highway. The differences in wear surface formed on BR tread and the other three are thought to be due primarily to the relatively high resilience of BR.

HS-013 910

TIRE TRACTION ASSESSED BY SHEAR FORCE AND VEHICLE PERFORMANCE

Tire Science and Technology v1 n4 p363-81 (Nov 1973)
P. S. Fancher, Jr., L. Segel 1973 4refs
See serial citation

Tire traction, Lateral force, Tire side forces, Braking forces, Tire loads, Wet road conditions, Tire road contact forces, Tire pavement interface, Wheel locking friction, Velocity, Shear stress, Vehicle performance

Tire shear force data for ten different types of passenger car tires tested on wet surfaces are studied to examine the influence of test surface, velocity, and load on the maximum lateral force, maximum braking force, maximum resultant force, and locked wheel braking force. Tire traction rankings based on these four measures are compared with each other and with rankings obtained from J-turn and diagonal braking tests on a vehicle equipped with the same types of tires using the rank difference correlation method. The findings show that rankings based on a small number of maximum lateral force tests correlate well with rankings based on J-turn tests.

HS-013 911

MECHANICS OF THE PNEUMATIC TIRE. PT. 2. THE LAMINAR MODEL UNDER INFLATION AND IN ROTATION

Tire Science and Technology v1 n4 p382-438 (Nov 1973)
E. Robecchi 1973 refs
See serial citation

Tire materials, Pneumatic tires, Laminates, Stress (mechanics), Tire cords, Elasticity, Tire tests, Mathematical models, Rubber compounds, Radial tires, Tire inflation pressure, Tire ply number, Tire rotation, Bias tires, Tire profiles, Tire mechanics

Difficulties in the study of the tire are presented by the materials used in tire construction, specifically the problem of achieving a convenient representation of the elastic characteristics of the rubberized fabric. Notable progress has been made in the formulation of the theory of combined orthotropic laminae which includes the contribution of the rubber compound and, more importantly, the effects of combining layers or plies having different characteristics. The laminar model of the tire is of particular interest for the study of the radial tire in which the effect of the carcass-belt combination is very important. This study first considers the tire under inflation alone and gives illustrative examples of applications to several types of tires. The net model for the bias ply tire is discussed as a special case of the theory. The study is then extended to consideration of the effects of centrifugal force in rotation in addition to inflation pressure.

HS-013 912

IS-103-VOL-1	HS-800 905	4A
100 922	HS-800 919	3B
R-73-6784	HS-800 922	5D
100 963	HS-800 923	5D
100 964	HS-800 959	1B
HS-034-2-263-VNP-73-1	HS-800 961	5I
-800 902	HS-800 962	1C
-TST-74-2	HS-800 963	5A
-013 904	HS-800 964	5A
A-RD-72-20	HS-800 971	5C
IS-013 967	HS-800 980	5D
RC-13497, " MS-134	HS-800 981	4E
HS-013 922	HS-800 982	5
PR-226 077	HS-800 989	5
HS-013 935	HS-800 990	1B
PR-226 634	HS-820 282	1B
HS-800 923	HS-820 283	1B
PR-227 055	HS-820 284	1B
HS-800 971	HS-820 305	3B
ZS-5272-V-1	PR-225 005	1C
HS-800 919	HS-800 919	5I
2310-73-61	PB-225 306	5A
HS-800 981	HS-800 902	5A
ASL-TIS-103-VOL-2	PB-225 335	5D
HS-800 923	HS-800 961	5D
R24-101-73	PB-225 347	4F
HS-800 971	HS-800 963	4F
FHWA-RD-73-21	PR-225 348	5J
HS-013 935	HS-800 964	5D
HLDI-R72-1	PB-225 836	4A
HS-013 934	HS-800 981	5D
HLDI-R73-1	PB-226 232	5D
HS-013 905	HS-800 980	4A
HS-013 901	PR-226 606	5D
HS-013 902	HS-800 905	4A
HS-013 903	PR-226 635	5D
HS-013 904	HS-800 922	2I
HS-013 905	PR-226 822	4E
HS-013 906	HS-013 967	1B
HS-013 907	PR-226 823	1B
HS-013 908	HS-800 982	18
HS-013 909	PR-226 828	18
HS-013 910	HS-800 959	2G
HS-013 911	PR-226 844	3F
HS-013 912	HS-820 305	
HS-013 913	PR-226 845	
HS-013 915	HS-013 904	

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CONTRACTS AWARDED

NHTSA CONTRACT AWARDS

DOT-HS-046-3-784 Mod. 2

LABORATORY TEST PROCEDURES

Dynamic Science
Division of Ultrasystems, Inc.
1850 West Pinnacle Peak Road
Phoenix, Arizona 85027

15 Feb 74 to 30 June 74

\$39,000.00

The contractor shall develop calibration procedures for Part 572, 50th percentile male dummies, and using these procedures, will perform calibrations for frontal, lateral, and oblique crashes. Twenty-four tests will be conducted.

DOT-HS-063-1-081 IA

ADVANCED BELT RESTRAINT SYSTEMS TESTS

Department of the Navy
Naval Air Development Center
Warminster, Pennsylvania 18974

2 Jan 74 to 30 June 74

\$150,000.00

Tests will be made to measure and evaluate the dynamic responses of dummies and humans when restrained by advanced belt restraint systems and subjected to dynamic deceleration-time simulated crash pulses of current-model automobiles in the compact and subcompact ranges. A maximum of eight tests will be conducted on each of a maximum of five systems at the nominal velocity levels of 10, 20, 30, and 40 miles per hour.

DOT-HS-099-3-673 Mod. 4

PASSENGER CAR PERISCOPE AND TRUCK MIRROR REARVIEW SYSTEMS

Dunlap and Associates
115 South Oak
Inglewood, California 90301

No change

\$4,529.00

This modification extends the study to include evaluation and mapping of view on vehicles equipped with rear view mirror and external convex mirror on the right under daylight and night driving conditions.

DOT-HS-237-2-406

FAF CASE REPORTS

State of South Carolina
State Highway Department
Drawer 191
Columbia, South Carolina 29202

1 Jan 74 to 31 Dec 74

\$14,000.00

This modification provides for payment for approximately 900 FAF cases to be reported to NHTSA during 1974.

DOT-HS-256-3-688 Mod. 2

BINOCULAR AND MONOCULAR FIELD OF VIEW PERFORMANCE TEST

Tracor/Jitco, Inc.
1300 E. Gude Drive
Rockville, Maryland 20851

Extended to 6 Mar 74

\$6,915.00

This modification specifies details of procedures for horizontal rearward measurements, to be made for passenger cars only.

DOT-HS-260-2-465 Mod. 13

SAFETY RELATED DEFECTS (SRD). INVESTIGATION OF AVCO MOTORHOME GASOLINE FUMES DURING REFUELING

Inland Testing Laboratories of General
Environment Corp.
7845 Nagle Avenue
Morton Grove, Illinois 60053

To be completed by 25 Feb 74

No change

Using a control group of at least three motorhomes which have not had the gasoline filler area sealed, and three motorhomes which have had that area sealed, testing will be conducted to determine explosibility levels of gasoline fumes. Monitoring of explosibility levels will be done under conditions of ambient temperature, time required to fill the gas tank and the amount of gasoline injected.

DOT-HS-339-3-726 Mod. 1

THREAT DETECTION TRAINING PROGRAMS FOR CHILD PEDESTRIAN SAFETY

Applied Science Associates, Inc.
Box 158
Valencia, Pennsylvania 16059

22 June 73 to 30 June 74

\$17,134.00

This modification provides for development and production of a Child Pedestrian Safety Training Film (approximately 10 minutes in length) which will employ the behavior modification techniques known as symbolic and vicarious modeling. Major purpose of the film will be to communicate the search and detection behaviour sequence in a manner to which children in grades K-3 age group will relate.

DOT-HS-354-3-716 Mod. 1

PILOT DIAGNOSTIC INSPECTION DEMONSTRATION PROJECT

District of Columbia
Department of Motor Vehicles
301 C Street, N.W.
Washington, D.C. 20001

30 June 73 to 30 June 74

\$1,396,000.00

To support the Diagnostic Inspection Demonstration Projects, a hardware installation will be designed, procured, and assembled as a Pilot Model integrated system to be operated with vehicles being examined for defects in various safety related components. Fundamentals of diagnostic inspection of the 2½ year study by this Pilot Model will be available to State representatives and other interested persons.

DOT-4-00805 Mod. 1

SAFETY BELT INTERLOCK SYSTEM: USAGE SURVEY

Opinion Research Corporation
North Harrison Street
Princeton, New Jersey 08540

5 Nov 73 to 5 Mar 75

\$29,369.00

This study is amended to determine the effectiveness of the belt restraint systems used in 1974 model cars in increasing belt usage. Drivers and front seat passengers will be observed in 1974 model cars to deter-

mine their usage of safety belts. Interviews with drivers will determine personal reaction to the system, methods of defeat and their incidence, and system reliability. Data will be collected from cars from among the general population of vehicles and from rental car return areas at 4 major airports.

DOT-HS-4-00836

CRASH RECORDERS, MODEL 35500

Teledyne Geotech
P.O. Box 28277
Dallas, Texas 75228

15 Feb 74 to 15 June 74

\$99,500.00

500 Crash Recorders, Model 35500, manufactured to meet the performance specifications defined in Appendix I, Crash Recorder Specification, will be delivered to NHTSA. An equal number of mounting assemblies for installation of these Crash Recorders will be submitted. The mounting assemblies will be manufactured per Geotech drawing 35559-01-01 under Contract DOT-HS-141-2-513. Special tooling for the production of crash recorders owned by DOT shall be made available for the use of Geotech at no cost.

DOT-HS-4-00839

SURVEY—ODOMETER DISCLOSURE

Small Business Administration
849 South Broadway
Los Angeles, California 90014

7 Jan 74 to 7 May 74

\$24,750.00

Used car dealers and purchasers in selected areas will be contacted to verify compliance with the Odometer Disclosure Requirement regulation, Part 580. Dealer and purchaser questionnaires are provided to elicit the desired information.

DOT-HS-4-00840

SURVEY—ODOMETER DISCLOSURE

Small Business Administration (prime)
Washington District Office
1030 15th Street, N.W., Washington, D.C. 20417
Lawrence Johnson & Associates, Inc. (sub.)
2001 S Street, N.W., Suite 502
Washington, D.C. 20009

To be completed no later than four (4) months after contract award

\$24,999.00

Contact will be made with used car purchasers and automobile dealers for verification of compliance with Odometer Disclosure Requirement regulation, seeking information from the dealer/salesman to substantiate the odometer reading. Weekly reports on contacts made will be summarized by specific metropolitan areas, and a final report submitted upon completion of the investigation. A total of 700 inquiries will be made through personal and telephone contacts.

DOT-HS-4-00847

INSTRUCTOR TRAINING IN USE OF NHTSA CURRICULUM PACKAGE: CRASH INJURY MANAGEMENT

Dunlap and Associates, Inc.
One Parkland Drive
Darien, Connecticut 06820

10 Jan 74 to 9 Oct 74

\$59,967.00

A 30-day course will be provided to selected instructors from state and community agencies. According to a prearranged schedule, a plan will be developed for the project, locations and dates for five sections selected, course outlines submitted, written material prepared and distributed to NHTSA regions, teacher-trainees assigned, the institute sections conducted and evaluated, and follow-up services recommended.

DOT-HS-4-00849

CONTRACT TECHNICAL MANAGEMENT SEMINAR

Sterling Institute
2600 Virginia Avenue, N.W.
Washington, D.C. 20037

21 Jan 74 to 7 Mar 74

\$14,600.00

This course shall be designed to cover the role and responsibilities of NHTSA contract management personnel throughout the procurement process, with emphasis on work statements, competition, contract awards, evaluation criteria, contract development and contract administration. Four 4-day sessions will be conducted for a maximum of 30 students in any one session.

DOT-HS-4-00851

ADMINISTRATIVE LOGISTICS AND TECHNICAL ADVISORY SUPPORT

Moshman Associates, Incorporated
6400 Goldsboro Road
Washington, D.C. 20034

16 Jan 74 to 17 Aug 74

\$19,500.00

Support services will be provided for the Third International Congress on Automotive Safety. These services include various responsibilities for selecting and inviting speakers and attendees, design of registration materials, registration of all personnel, evaluation of abstracts, provision of camera-ready copy of manuscripts, program agenda, coordination of programs and meetings, and support for the NHTSA Public Information Staff.

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